WILLIAM SMELLIE AND THE MECHANISM OF LABOR

HARRY OXORN, M.D., F.R.C.S. (C.), MONTREAL, QUEBEC

(From the Department of Obstetrics and Gynaecology, Royal Victoria Hospital, and McGill University)

IT IS an enigma of history that a man’s name is not always associated with, or remembered for, his best work. William Smellie is a good case in point. Mention of his name brings to mind the Mauriceau-Smellie-Veit maneuver for delivery of the aftercoming head. In the first place, while Smellie may have figured out this procedure independently, most historians acknowledge Mauriceau’s claim to priority. In the second place, this maneuver, useful as it may be, is of minor importance when compared with his many far greater contributions to obstetrics.

William Smellie, the Master of British Midwifery, was born in Scotland in the township of Lanark in 1697, and died there in 1763 at the age of 66. He spent all but 20 years of his life in Lanark.

Life of Smellie

Boyhood and Education.—Our knowledge of Smellie’s boyhood, his early education, and his medical training is not accurate. While Smellie was born into, and practiced in, a Scotland which was in a state of direst poverty, his parents were in comfortable circumstances. He was probably an only child, and received his education at the grammar school in Lanark. He studied music and art, and his likeness which hangs in the Royal College of Physicians in Edinburgh is believed to be a self-portrait. He married Eupham Borland in 1724 when he was 27, and while the union was a happy one, the couple had no children.

His medical training, by apprenticeship, was probably attained in Glasgow under Dr. John Gordon. This prominent physician later trained Tobias Smollett, who became a famous novelist. Smellie began practice in 1720 without a medical degree. In 1733 he became a member of the Faculty of Physicians and Surgeons of Glasgow. In 1745 he received the degree of M.D. of the University of Glasgow.

He began his career in Lanark in 1720 at the age of 23, and remained for 19 years. He left in 1739 to settle in London. In 1759 he retired to his birthplace where he worked on his book until his death in 1763.

Early Practice.—In Lanark Smellie practiced general medicine including surgery. There is a bill extant dated 1723 for the amputation of a leg. He was interested in midwifery and made careful notes on his unusual cases. His reputation grew rapidly, and he was called in consultation by both the local midwives and those in surrounding towns. Smellie must have been physically fit, for most of his journeys to neighboring villages were on foot or on horseback over rough roads. In his early years he had no forceps, and he wrote that
when the head was high he could deliver by version and extraction, but that when the head was impacted low in the pelvis he was forced to perform a destructive operation on the child.

_Move to London._—While he carried on his general practice his experience in obstetrics grew steadily. In 1739 he left Lanark. The reason for this move is not known. He was likely dissatisfied with some aspect of his obstetrical knowledge or ability. He went first to London to attend lectures on midwifery, and thence to Paris to see the Gregoires, father and son. He was impressed in neither city. Feeling, probably, that he knew as much as and could teach as well as the men he met, he returned to London and settled there in 1740 for the purpose of practicing and teaching midwifery.

The living conditions in London were dreadful. Housing was deplorable. Families lived in a single room often without a window, to avoid paying the window tax. Personal hygiene and standards of cleanliness were on a low level in all classes. Among the poor only one child out of four survived its fifth year. The exposure on the streets of unwanted children and even deliberate infanticide were commonplace.

Obstetrics was controlled by the midwives. No formal training was required, and any woman could set herself up in practice. Licensing was in the hands of the bishops, who based their decisions on moral grounds rather than on skill and knowledge. Many of these women knew little and cared less. Smellie campaigned for the training and examination of midwives, and their supervision by competent medical personnel. At the same time he fought for the status of the doctor as obstetrician. He recognized the need for efficient maternity services, and largely as a result of his efforts, several lying-in hospitals were opened in London. For unknown reasons he never attained a position on the staff of any of these institutions.

Smellie worked in London for 20 years. Having neither social graces nor social ambitions, he did not attract the aristocratic clientele of his pupil and rival, William Hunter. Smellie’s skill, sagacity, and humanity were evident in the lying-in room, and he described his private practice as being “pretty extensive.” While he could be frank and outspoken when the occasion demanded it, as a rule he did not speak easily with people. He had, however, many friends of first rank.

_Teacher of Obstetrics._—He began teaching in 1741, giving private courses for which the students paid. A course of instruction lasted two weeks. Two hours each day were given over to lectures on theory and practice. Smellie was mechanically minded and constructed ingenious models of the fetus and the human pelvis. On these machines he demonstrated the various presentations of the fetus, and the course and management of labor in normal and abnormal cases. Smellie realized that this was not enough, that adequate instruction could not be achieved without clinical demonstrations on living patients. Copying the method of Gregoire in Paris, he let it be known that he, with his students, would attend the confinements of poor women in their own homes, free of charge. Each student paid 6 shillings into a common fund to assist the especially needy patients.

Smellie was one of the earliest teachers of midwifery in Great Britain, and he surpassed by far the few men who preceded him. During 10 years he gave 280 courses to more than 300 students from all parts of the world. In that series over 1,100 women were delivered free of charge.

Smellie was attacked by three groups of people. (1) Because he was the chief exponent of null midwifery he was the subject of scurrilous pamphlets by the midwives. Constant reference was made to his large hands and the indecency of men doing vaginal examinations. (2) Because he was the best
teacher of his time he aroused the envy of lesser men. (3) Because he thought for himself, investigated for himself, and refused to accept what had been handed down from the time of Hippocrates, he aroused the bitter antagonism of the supporters of the traditional teaching. One of his most violent attackers was a prominent obstetrician, John Burton, who became the model for Doctor Slop in Sterne’s novel, *Tristram Shandy*. Other attackers included William Douglas, Philip Thicknesse, and Mrs. Elizabeth Nihell, the leading midwife of her day. Smellie shunned publicity and scarcely deigned to answer his critics. He did not let these attackers deter him, nor did they arrest the success of his school of instruction, for pupils came from all parts of the world.

**Obstetrical Contributions**

*Normal Mechanism of Labor.*—Had William Smellie done nothing else, his description of the passage of the fetal head through the maternal pelvis would have won him a place in history. His work on the mechanics of labor is the basis of scientific midwifery, one of the great contributions to obstetrics.

Before Smellie’s original work, most of the doctrines were passed down from the ancients, author to author, without any new observations being made. Smellie was one of a very few men who, because they attempted to replace tradition by personal observation, were attacked as heretics. So it was with the mechanism of parturition. The current belief was that the baby entered the pelvis in the anteroposterior diameter, occiput toward the symphysis and face to the sacrum, and passed through the pelvis by virtue of its own efforts aided by the propulsive force of the uterus. It was as though, with the woman lying on her back, the baby crawled into the world on its hand and knees. There was no suspicion that there was any complexity in the process, and hence no understanding of difficult cases.

The only writer before Smellie to challenge tradition was Fielding Ould. He noted: ‘The breast of the child does certainly lie on the sacrum of the mother, but the face does not; for it always (when naturally presented) is turned to one side or the other, so as to have the chin directly on one of the shoulders.’ Ould reasoned that the longest diameter of the head and of the shoulders should enter the largest diameter of the inlet, which he believed to be the transverse. He did not see that the head could not continue in the pelvis in the transverse, but had to turn, which suggests that he did not make a careful study of the whole pelvis. He detracted from his original and important observation by stating that the chin of the fetus had to rest on one of the shoulders at all times. In his writings Smellie acknowledged the importance of Ould’s observations.

After careful study Smellie described the structure and form of the female pelvis. Making a point of fundamental importance, he wrote: ‘From these particulars, any person will perceive the advantage of remembering that the pelvis at the brim is wider from side to side, than from the fore to the back part, whereas below it is the reverse in point of dimension; that the pelvis is much shallower at the os pubis than at the sides and the back part; and that the sacrum and coccyx form a large concave in their descent, while that of the os pubis is perpendicular.’ He noted that the pelvis varies from one woman to another, he described a variety of abnormal pelves, and he pointed out that the fetal head is greater from front to back than from side to side.

Smellie went on to describe the passage of the fetal head through the pelvis: ‘This therefore is the manner of its progression. When the head first presents itself at the brim of the pelvis, the forehead is to one side, and the hind head to the other, and sometimes it is placed diagonal in the cavity; thus the widest part of the head is turned to the widest part of the pelvis, and the narrow
part of the head, from ear to ear, applied to the narrow part of the pelvis between the pubis and the sacrum. The head, being squeezed along, the vertex descends to the lower part of the ischium where, the pelvis becoming narrower at the sides, the wide part of the head can proceed no further in the same line of direction; but the ischium being much lower than the os pubis, the hind head is forced in below this last bone, where there is least resistance. The forehead then turns into the hollow at the lower end of the sacrum, and now again the narrow part of the head is turned to the narrow part of the pelvis. The os pubis being only two inches deep, the vertex and the hind head rise upward from below it; the forehead presses back the coccyx; and the head, rising upward by degrees comes out with a half-round turn from below the share-bone; the wide part of the head being now betwixt the os pubis and the coccyx, which, being pushed backwards, opens the widest space below, and allows the forehead to rise up also with a half-round turn from the under part of the os externum."

Thus Smellie described engagement in the transverse, internal rotation, flexion, and extension. Later authors claimed that engagement was in the oblique and not in the transverse, but more recent x-ray studies have shown Smellie to be correct. He was in error in believing that the transverse diameter of the inlet is the largest, while actually it is the oblique. On the basis of his own observations and his own reasoning Smellie gave us the first accurate description of the passage of the fetal head through the pelvis. He was the second (after Ould) to question the truth of the traditional beliefs handed down from Hippocrates.

The Obstetrical Forceps.—The available instruments were mainly of destructive intent. These included the fillet or lack, a ribbonlike loop of woven material which had to be manipulated over one of the prominences of the head to provide for traction, the blunt hook, and the crochet or sharp hook which was used for both traction and dismemberment. The perforators were excessively complicated, so Smellie made a combination scissors-perforator, which because of its simplicity and effectiveness became the model for subsequent perforators. Until the advent of the forceps, any operative delivery was usually a destructive one.

The Chamberlens invented the obstetrical forceps, but Smellie taught us how to use them properly. Baudeloue had this to say: "No one had more confidence in the forceps than Smellie, no one rendered them of more general use, nor applied them more methodically or with greater success."

Smellie did not have forceps in the first 13 years of his practice, and often the child had to be destroyed before delivery could be effected. He learned of the forceps in 1735 and introduced them into his practice. The first instrument he had was the Dusé forceps, a long heavy instrument with solid blades. He was not satisfied with his early use of the forceps and set out to improve both the instrument and his technique.

Smellie invented what is known today as the English lock, but for many years it was called the Smellie lock. It is so good that it has remained unaltered to the present time. He made and used a small, light, straight forceps with a short handle. He believed that this instrument, measuring less than 12 inches, was the safest for the majority of cases. He noted that "... Forceps may take such firm hold, that with great force and a strong purchase the head will be delivered; but such violence is commonly fatal to the woman, by causing such an inflammation, and perhaps laceration, of the parts as is attended with mortification. In order to disable young practitioners from running such risks, and to free myself from the temptation of using too great force, I have always recommended the forceps so short in the handles, that they cannot be used with
such violence as will endanger the woman's life; though the purchase of them is sufficient to extract the head when one half or two thirds of it are equal to or past the upper or narrow part of the pelvis."

Difficulty with the aftercoming head in breech deliveries, and with the head high in the pelvis in cephalic presentations, prompted his making a long forceps, 12½ inches longer than the short ones, and with a marked pelvic curve. He found that the curve of the forceps fitted the curve of the pelvis better than the straight ones did, and he was able to get a better grip on the head. The basic design of this instrument has not been changed to this day.

Because of the prevailing belief that the only purpose of instruments was to destroy undeliverable babies special gowns and techniques were developed so that neither the patient nor her relatives would realize that forceps were being used. To avoid the noise which metal blades made, Smellie tried wooden forceps, and then metal forceps with the blades wrapped in leather bindings. Both of these ideas proved to be impractical and unsanitary, and were given up. Smellie was accused of using forceps too often, but he maintained that he used them only when necessary, after he had given nature every opportunity to effect delivery.

Dissatisfied with current methods of using forceps, he described techniques and formulated rules for the proper use of forceps which hold good today. He remarked, "The common way of using them formerly was by introducing each blade at random, taking hold of the head anyhow, pulling it straight along, and delivering with downright force and violence; by which means both os internum and externum were often tore, and the child's head much bruised. On account of these bad consequences they had been altogether disused by many practitioners. I began to consider the whole in a mechanical view, and reduce the extraction of the child to the rules of moving bodies in different directions. In consequence of this plan I more accurately surveyed the dimensions and form of the pelvis, together with the figure of the child's head and the manner in which it passed along in natural labours; and from the knowledge of these things, I not only delivered with greater ease and safety than before, but also had the satisfaction to find, in teaching, that I could convey a more distinct idea of the art in this mechanical light than in any other..."

Some of the points which Smellie emphasized include the following: (1) every bad position of the head should be altered before the forceps are applied; (2) the blades should be applied over the ears whenever possible; (3) traction should be applied during uterine contractions, with a side-to-side movement. (4) The direction of traction must be changed as the head emerges under the symphysis. This last movement, now called extension, was first clearly demonstrated by Smellie. Thus Smellie emphasized the importance of knowing the exact fetal position, he advocated the cephalic application of the forceps, and he taught that traction must be made along the lines of direction of the pelvic canal.

Posterior Positions of the Head.—The treatment for persistent occiput posterior was podalic version. Smellie made a practice of correcting this position by hand. Later, almost by accident, he found in a case that he could not turn by hand, that he could do so with the forceps, and so became the first man to use forceps for the purpose of rotation. When he was unable to rotate the head he delivered it face to pubis.

Smellie described the delivery of posterior positions in this way: "The blades of the forceps should be introduced along the ears, or as near them as possible, according to the foregoing directions, the head must be pushed up a little, and the forehead turned to one side of the pelvis; thus let it be brought along until the hindhead arrives at the lower part of the ischium; then the forehead must be turned backward, into the hollow of the sacrum, and even a
quarter or more to the contrary side, in order to prevent the shoulders from hitching on the upper part of the os pubis or sacrum, so that they may be still towards the sides of the pelvis; then let the quarter turn be reversed, and the forehead being replaced in the hollow of the sacrum, the head may be extracted as above."

Breech Presentation.—In his writings Smellie advised breech extraction as soon as the feet or the knees reached the cervix. He did not seem to realize that pulling on the legs too soon might cause extension of the head and the arms, and so complicate the case seriously. In his later years he recognized the wisdom of trusting to nature, and he interfered less in breech and footling presentations. On the other hand he did not, as we do today, bring down the arms before delivery of the head. He said: “Indeed, if the pelvis is not narrow, nor the head very large, and the arms lie along the sides of the head, there is seldom occasion to pull them down . . . but when . . . the head sticks in the pelvis, they ought certainly to be brought down; or even when the head comes with difficulty.”

Smellie emphasized that the baby’s body be turned so that the head is born with the occiput anterior, and described the manner of putting a finger in the baby’s mouth to maintain flexion of the head. He gave the details of what is known today as the Mauriceau-Smellie-Veit maneuver. First the accoucheur brings down both arms. Then “If one finger of his right hand be forced in the child’s mouth, let the body rest on that arm; let him place the left hand above the shoulders, and put a finger on each side of the neck; if the forehead is towards one side at the upper part of the pelvis, let him pull it lower down, and gradually turn it into the hollow of the sacrum; then stand up, and in pulling raise the body so as to bring out the head in a half-round turn.” There seems to be no doubt that Mauriceau was the first to describe the Mauriceau-Smellie-Veit maneuver. We do not know if Smellie heard of Mauriceau’s work, or if his was an independent finding. Certainly Smellie recommended it to England. Veit’s contribution was that he made the maneuver popular in Germany. There is, however, good reason to believe that Smellie was the first to advocate forceps on the aftercoming head.

Delivery of the Placenta.—The belief at this time was that the cervix clamped down right after the birth of the baby, and that the placenta must be delivered before this happened. Some favored immediate manual removal, others preferred pulling on the cord. At first Smellie adhered to the cord-pulling school but he gradually changed his ideas, and waited to give nature a chance before interfering. He said: “ . . . so, in my opinion, we ought to go the middle way, never to assist but when we find it necessary; on the one hand, not to torture nature when it is self-sufficient, nor delay it too long, because it is possible that the placenta may sometimes, though seldom, be retained several days; for if the uterus should be inflamed from any accident, and the woman be lost, the operator will be blamed for leaving the afterbirth behind.”

Cesarean Section.—Smellie never did a cesarean section on a live patient. He performed three postmortem cesarean sections on women who died from placenta previa, but all the babies were born dead. He did, however, realize the possibilities of cesarean section, and said:

“When a woman cannot be delivered by any of the methods hitherto described and recommended . . . in such emergencies, if the woman is strong and of a good habit of body, the Caesarian operation is certainly advisable, and ought to be performed; because the mother and child have no other chance to be saved, and it is better to have recourse to an operation which hath sometimes succeeded, than leave them both to inevitable death. Nevertheless, if the woman is weak,
exhausted with fruitless labour, violent floodings, or any other evacuation which renders her recovery doubtful, even if she were delivered in the natural way; in these circumstances it would be rashness and presumption to attempt an operation of this kind, which ought to be delayed until the woman expires, and then immediately performed with a view to save the child.'"

Smellie was distressed over the number of craniotomies, and he had this to say: "Midwifery is so much improved, that the necessity of destroying the child does not occur as often as formerly. Indeed it should never be done, except when it is impossible to turn or deliver with forceps; and this is seldom the case but when the pelvis is too narrow, or the head too large to pass, and therefore rests above the brim . . . because in these two cases there is no room for hesitation; for if the woman cannot possibly be delivered in any other way, and is in imminent danger of her life, the best practice is undoubtedly to have recourse to that method which alone can be used for her preservation, namely, to diminish the bulk of the head."

False Labor.—That the problem of distinguishing false from true labor is not a new one is shown by Smellie's detailed notes on the subject. "If the os uteri remains close shut, it may be taken for granted that the woman is not yet in labor, notwithstanding the pains she may suffer. Sometimes the os internum may be a little dilated, and yet it may be difficult to judge whether or not the patient be in labour. The case, however, may be ascertained after some attendance, by these considerations. If the woman is not arrived at her full time; if no soft or glairy mucus hath been discharged from the vagina; if the pains are limited to the region of the belly without extending to the back and inside of the thighs; if they are slight, and continue without intermission or increase; nay, if they have long intervals, and recur without force sufficient to push down the waters and membranes, or the child's head, to open the os internum; if this part be felt thick and rigid, instead of being soft and thin and yielding; we may safely pronounce that labour is not yet begun.'"

Artificial Rupture of the Membranes.—Smellie recognized the value of artificial rupture of the membranes: "When the membranes, therefore, are strong or unadvanced, and continue so long unbroke that the delivery is retarded, provided the os internum be sufficiently dilated, they ought to be broke without further delay, especially if the woman hath been much fatigued or exhausted with labour, or is seized with a violent flooding, in which case the rupture of the membranes hastens delivery, and the haemorrhagy is diminished by the contraction of the uterus, which lessens the mouth of the vessels that are also compressed by the body of the child.'"

Seven- and Eight-Month Gestations.—Smellie was the first to deny that a 7 months' baby had a better chance for survival than one born after 8 months' gestation. He said: "Hippocrates alleges that a child born in the seventh month sometimes lives; whereas if it comes in the eighth month it will probably die; because all healthy children, says he, make an effort to be born in the seventh month; and if they are not then born, the nisus is repeated in the eighth, when the child must be weakened by his former unsuccessful attempt, and therefore not likely to live; whereas should the second effort be deferred till the ninth, the foetus will by that time be sufficiently recovered from the fatigue it had undergone in the seventh. Experience, however, contradicts this association: for the older the child is, we find it always the stronger, consequently the more hardy and easily nursed. Neither is there any sufficient reason for adhering to the opinion of Pythagoras on this subject, who declared that number eight is not so fortunate as seven or nine."
Other Contributions.—Included among Smellie’s contributions are the following: He was the first to publish an illustration of a rachitic pelvis.

He proved the falsity of the belief that the placenta was always in the fundus of the uterus by showing that it could be anywhere.

He disproved the theory that it was harder for a woman to give birth to a dead child than a live one, by showing that the child was a passive agent, and that its being alive or dead had no effect on the labor.

He was the first to revive an asphyxiated infant by inflation of the lungs through a silver catheter.

He disproved the belief, handed down from Hippocrates, that the baby presented as a breech until the seventh month and then turned to a vertex.

Misconceptions.—There are, of course, many things which Smellie did not know or understand, and some of the things that he knew turned out to be wrong.

In company with his confreres he did not understand conception.

He did not know that the uterus is a muscular organ.

He did not divide labor into stages; this was done by Denman.

He was erroneous in advising early interference in face presentations—podalic version if high, forceps if low.

Smellie believed that menstruation was a discharge of collected blood, and that “if the flow is too seldom and in too small quantity a dangerous plenitude ensues, the plethora must be lessened by plentiful bleeding and repeated purges, and the discharge solicited by warm baths, fumigations, and exercise.”

Medical Writings.—Smellie left two main works. His Anatomical Tables contain 39 plates. It is believed that 26 of these were drawn by Rymsdyk and 13 probably by Smellie himself. These plates show the anatomy of the pelvis and various normal and abnormal obstetrical conditions.

His Treatise on the Theory and Practice of Midwifery consists of three volumes. The first volume is, strictly speaking, the treatise proper, and contains the substance of his lectures. In the second and third volumes are the clinical records of 531 cases, each designed to illustrate one of the subjects discussed in the first volume. The first volume was published in 1752, and the second in 1754. The third appeared in 1774, after Smellie’s death, edited anonymously, as were the other volumes, by his friend Tobias Smollett. His books were most popular, and were translated into French and German during his lifetime.

Conclusion

It is difficult to describe in a few words the qualities and accomplishments which made Smellie great. He considered that industry was his chief virtue. His judgment was accurate, for he worked uncommonly hard. He had the rare power of original observation and thought, and the courage to dispute the beliefs handed down unchallenged from Hippocrates. He believed that the theory must be made to fit the facts. When the ancient theory did not agree with the facts as he saw them, he had the good sense to stick with the facts and change or discard the theory.

By this process of constant study and re-examination he arrived at his greatest and at the same time his most fundamental contribution to obstetrics—the description of the passage of the fetus through the pelvis, which forms the basis of modern obstetrics.
He taught the precise use of forceps, in accordance with the mechanism of labor and the anatomy of the pelvis.

He was the outstanding teacher of his day, and successfully combined theoretical and clinical teaching. His students came from all over the world, and the spread of his influence was immense.

Smellie was a careful student of nature's methods. He said, "I diligently attended to the course and operations of nature which occurred in my practice, regulating and improving myself by that infallible standard."

He did much to dissipate the prejudice against the man midwife, and one of the results of his efforts was the recognition of the need for efficient maternity services, and lying-in hospitals. The hospitals were built, but Smellie was never appointed to the staff of any of them.

McClintock said: "That he was a close observer and correct interpreter of nature all will admit. But more than this, he seems to have been actuated with a sincere desire for the advancement of his art, and to have been free from all narrow-minded or selfish prejudices in favour of his own improvements."

Herbert Spencer wrote in 1927: "In concluding this brief account of the greatest of British obstetricians, one must make a tribute of admiration for his great achievements in circumstances which would have discouraged a less heroic man. Without powerful friends to help him, without the advantages of a hospital clinic, but attending and teaching in the homes of the poor, by sheer devotion to his art he raised himself to the foremost position in his profession, which he enriched with many original contributions."

References