THE KIELLAND OBSTETRICAL FORCEPS AND ITS APPLICATION*

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VERY little has been written about the Kielland forceps in American medical literature. Only a few standard textbooks on obstetrics make even passing mention of the new forceps in their latest editions. Greenhill, however, in the American Journal of Obstetrics and Gynecology (1924, vii, 349), gave an extensive review of the foreign literature on the subject. I am impressed with the usefulness of the Kielland forceps and am convinced of its superiority over the classical forceps, in cases where the head is situated high in the birth canal, and where the head is deeply located in the pelvis with the sagittal suture in the transverse or oblique diameters.

The objections to the pelvic curve of the forceps were recognized among others, by Christian Kielland of Christiania, Norway. He devised an instrument which has a very slight pelvic curve and in

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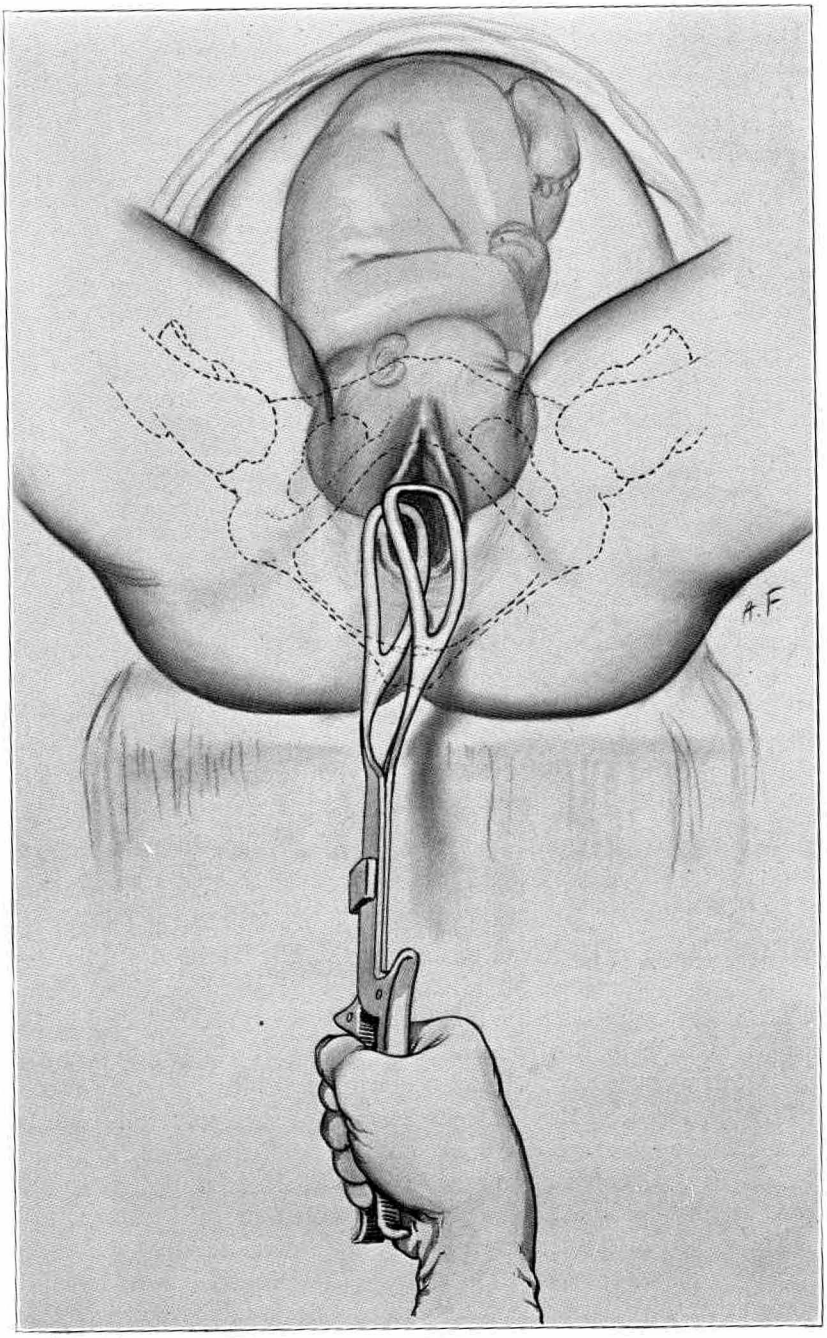

Fig. 1.

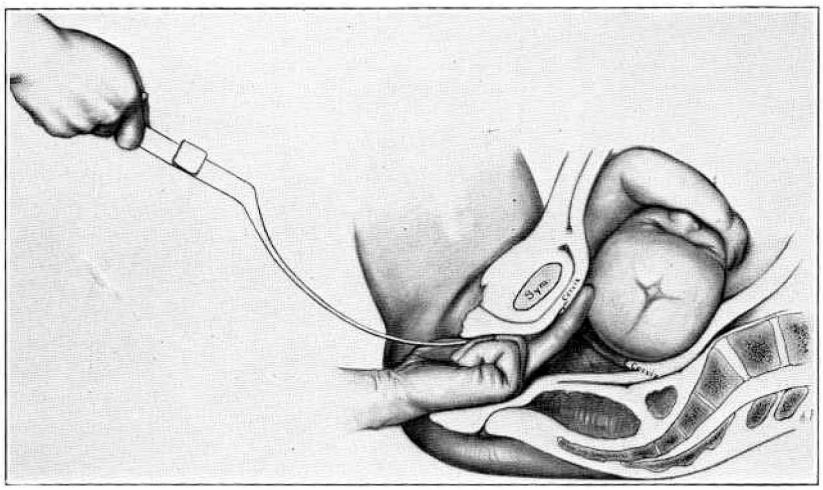

Fig. 2.

reality is a retrogression from the Levret forceps, reverting closer to the old short forceps of Smellie. In May, 1915, Kielland demonstrated his instrument before the Münich Gynecological Society and reported that since 1908, he had delivered 352 women with the new instrument.

In construction, the Kielland forceps varies from the classical forceps in three outstanding features. The most significant departure lies in the shape of the instrument, which lacks almost entirely a pelvic curve and resembles a bayonet. In place of the English or French lock, the Kielland forceps has a sliding lock which consists of an in-

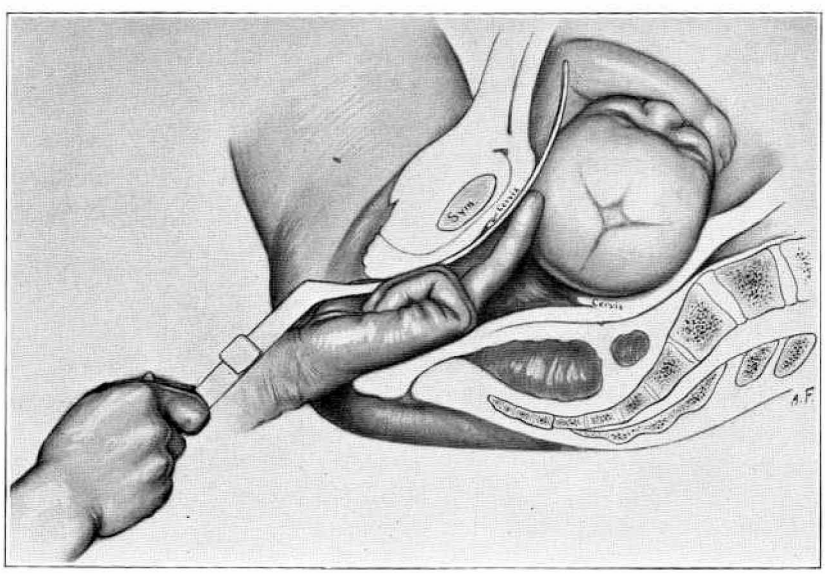

Fig. 3.

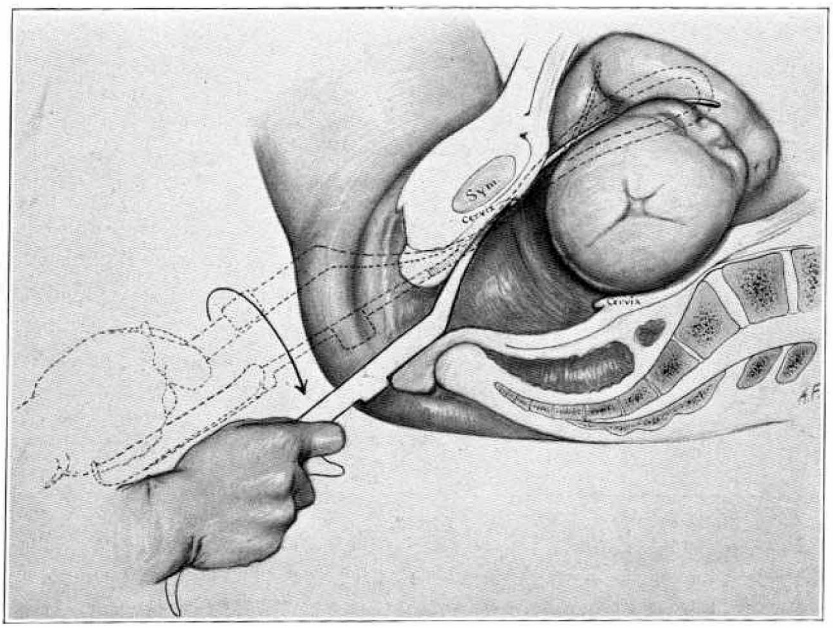

Fig. 4.

verted L-shape, square-edged hook, attached to the middle of the shank of the left branch of the forceps. The shank of the right branch is flat and slides up and down in this hook. On each handle is a small knob, which, as we will later see, is used to indicate the direction in

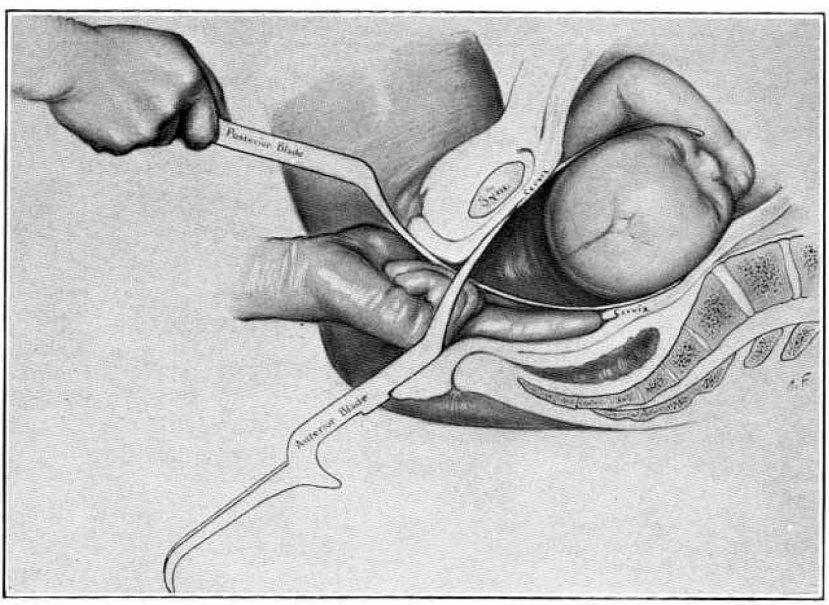

Fig. 5.

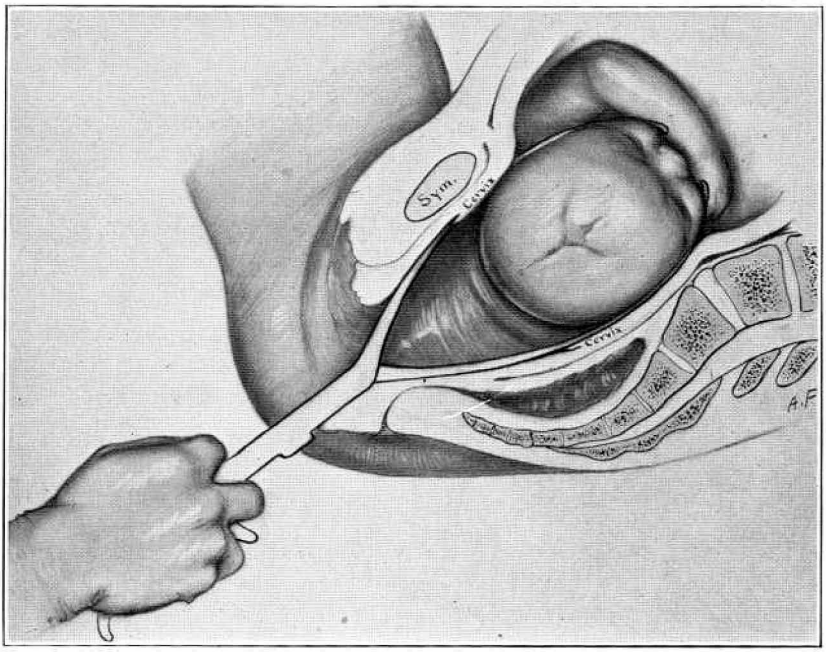

Fig. 6.

which rotation of each branch of the forceps is to take place. Another marked departure of the Kielland forceps from the classical forceps is its lightness of construction.

Besides devising the forceps already described, Kielland perfected a technic of application which differs essentially from that of the classical forceps.

In Vienna, the use of the Kielland forceps received a great setback through the adverse criticism of Shauta, and for several years its use

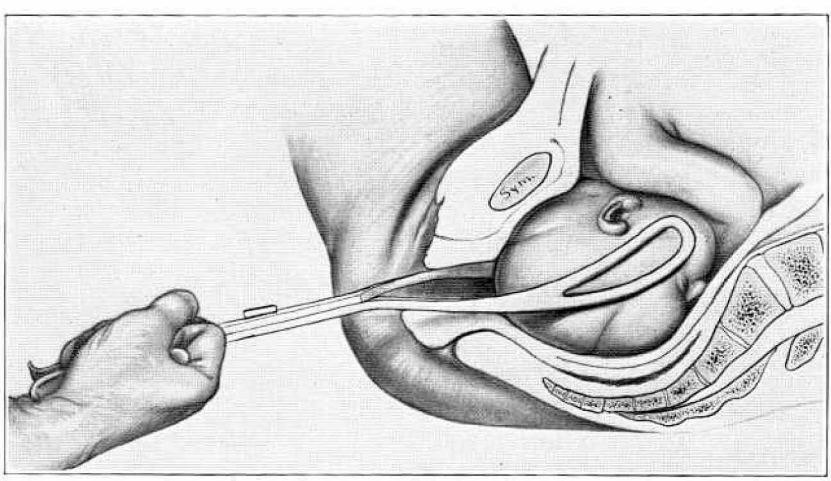

Fig. 7.

was kept up only by Wilhelm Rosenfeld, the head of the Lucina Hospital. Later, with the passing of Shauta, the younger men at the University of Vienna began to use the Kielland forceps extensively. It is practically due to the prolific writings and teachings of Heidler, a young and able worker at Kermauner's clinic at this university, that the Kielland forceps was popularized in Vienna.

Wilhelm Rosenfeld, with whom the author had the opportunity to work in the Lucina Hospital, claims that the bad results attributed to the Kielland forceps are not due to any fault of the instrument, but to the fact that in all probability, it was applied when marked disproportions or other contraindications to the use of forceps were present or when correct diagnosis of the position of the head, the direction

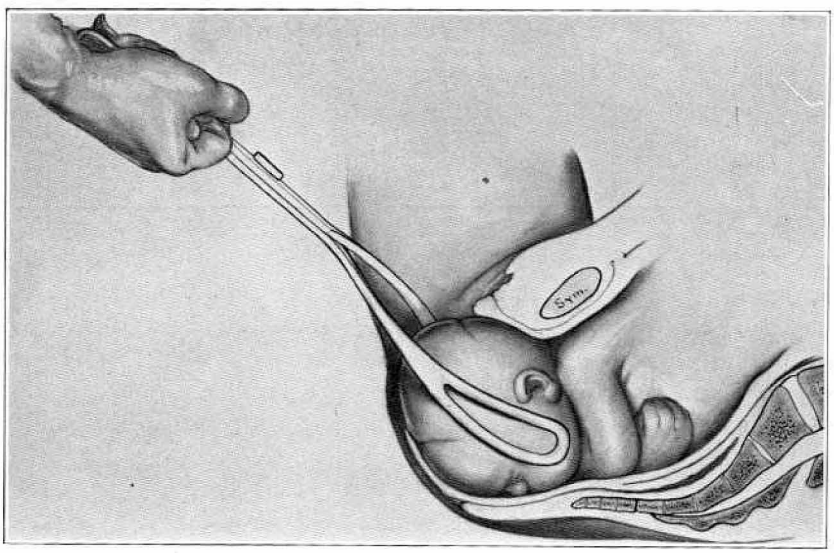

Fig. 8.

of the sagittal suture and position of the fontanels was not made. He personally delivered 256 cases without a single untoward result. While working with Heidler, I received practically the same expressions from him, namely, that there is not a single case which indicates the application of forceps, where the Kielland forceps could not be used more advantageously than any other model now employed. Even when the head is high in the birth canal, and a high application of forceps is to be performed, Heidler prefers the Kielland to the Tarnier axis-traction forceps. By doing an episiotomy, the handles of the forceps may be brought downwards, posterior and towards the coccyx, thus exerting traction in a straight line, in the axis of the pelvis. Von Schubert is also of the opinion that the Tarnier axis-traction forceps may be dispensed with and the Kielland forceps used in their stead.

When the head is situated high in the pelvis, the following technic is recommended by Kielland in applying high forceps.

The patient is brought to the edge of a bed or table and placed in the lithotomy position. The operator must make an absolutely correct determination of the level to which the head is descended, the direction of the sagittal suture in relation to

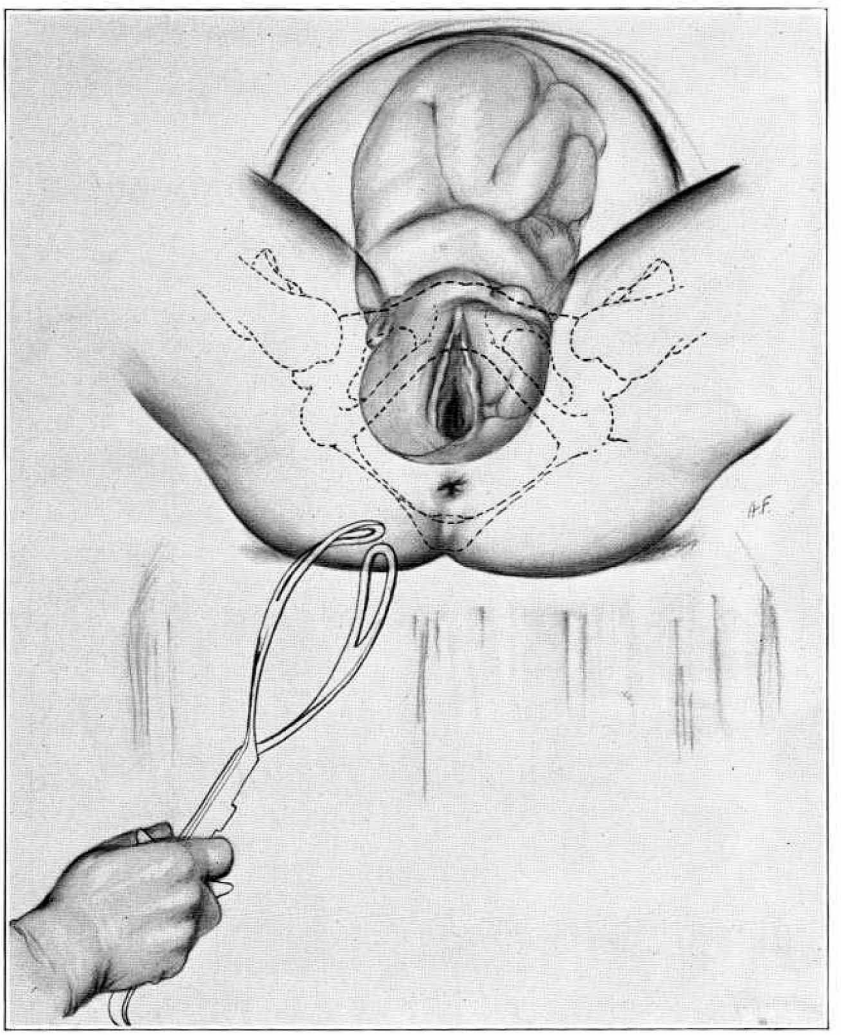

Fig. 9.

the pelvic diameters, and the position of the fontanels, all under narcosis. The right and left branches of the forceps are articulated and held in front of the external genitals in such a position that they can be visualized in the desired position over the parietals of the baby's head in the birth canal (Fig. 1). The concave margins of the blades are held towards the leading point of the head, which in vertex presentation is the occiput and in face presentation is the chin. As the forceps is held before the genitals, the upper branch, which is the one nearer the

operator, is selected to be introduced first and anteriorly into the birth canal. The anterior branch must always be introduced first.

The index and middle fingers of the left hand are introduced into the birth

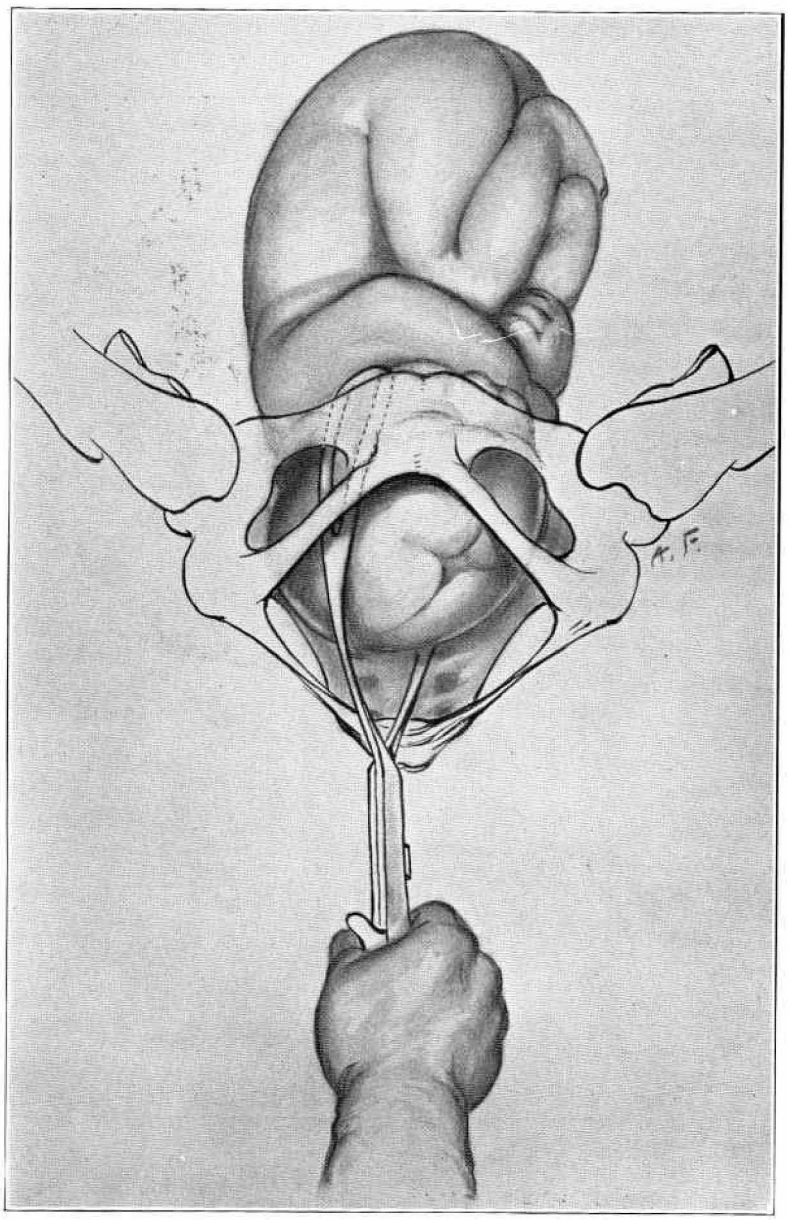

Fig. 10.

canal, behind the anterior margin of the cervix and in front of the head. The anterior branch of the forceps is held firmly in the right hand, not as one would hold the classical forceps, like a writing pen, but as one would grasp a sword (Fig. 2). The anterior branch is held with the cephalic concave surface directed towards

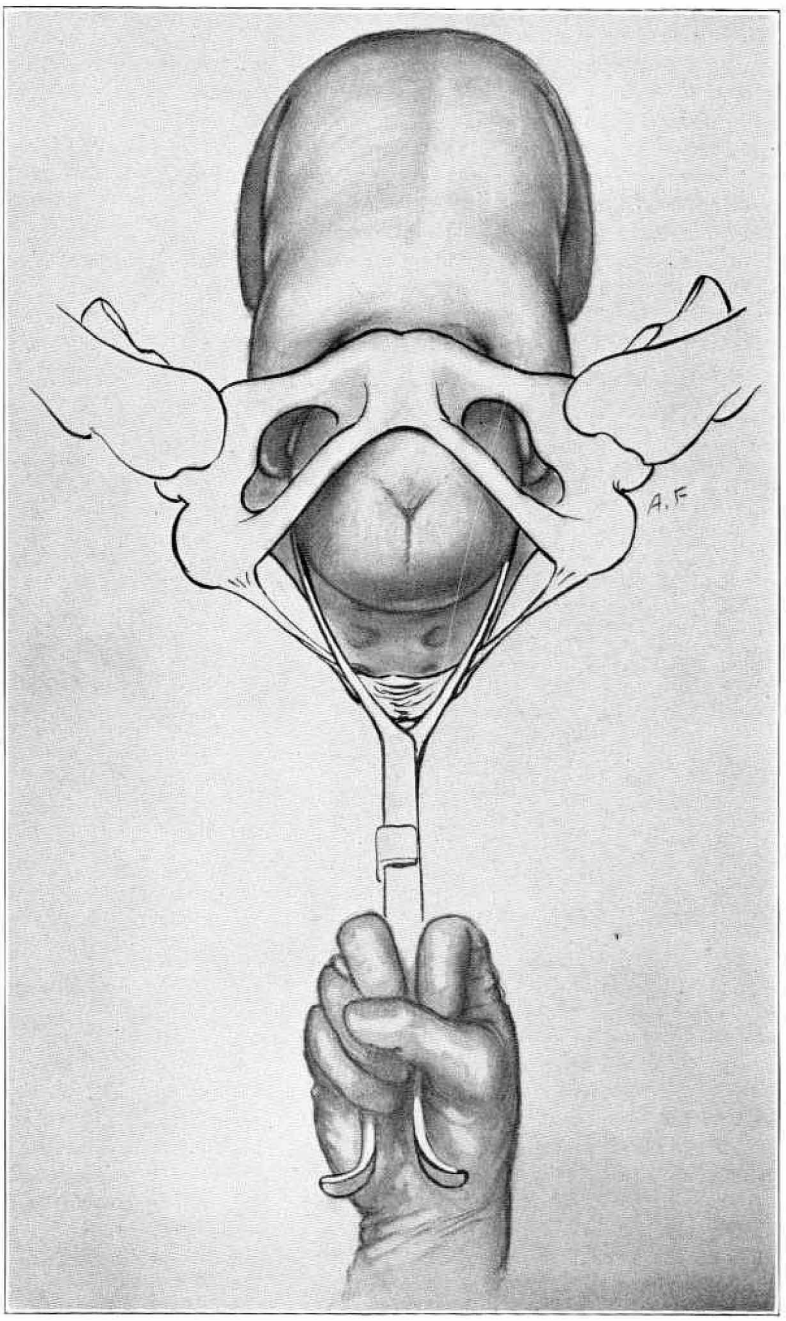

Fig. 11.

the ceiling. This branch of the forceps is guided by the fingers of the left hand. The blade is gently pushed in until it touches the head, guided by the fingers of the left hand under the symphysis and posterior to the anterior margin of the cervix, and in front of the head. At this stage of the procedure, the concave

cephalic surface of the blade is directed anteriorly and somewhat upwards (Fig. 3). As long as the operator feels that the blade is gliding in without resistance, it is pushed gently upwards. When the blade is introduced far enough, the shank of the anterior branch should rest on the posterior vaginal wall. The operator may now withdraw the left hand from the birth canal. As the blade is still with the cephalic surface anterior, the next step is the rotation of the blade, so that the cephalic concave surface comes in contact with the convex surface of the head. The rotation should take place in the direction of the side on which the concave margin of the blade points (Fig 4). Kielland has placed a small knob on each handle of the forceps, as has already been mentioned in the description of the instrument. This rotation then, is made to the side on which the knob is found. During rotation, the handle is held very lightly and is gently pushed upwards in the corkscrew fashion in the direction indicated. With rotation completed, the

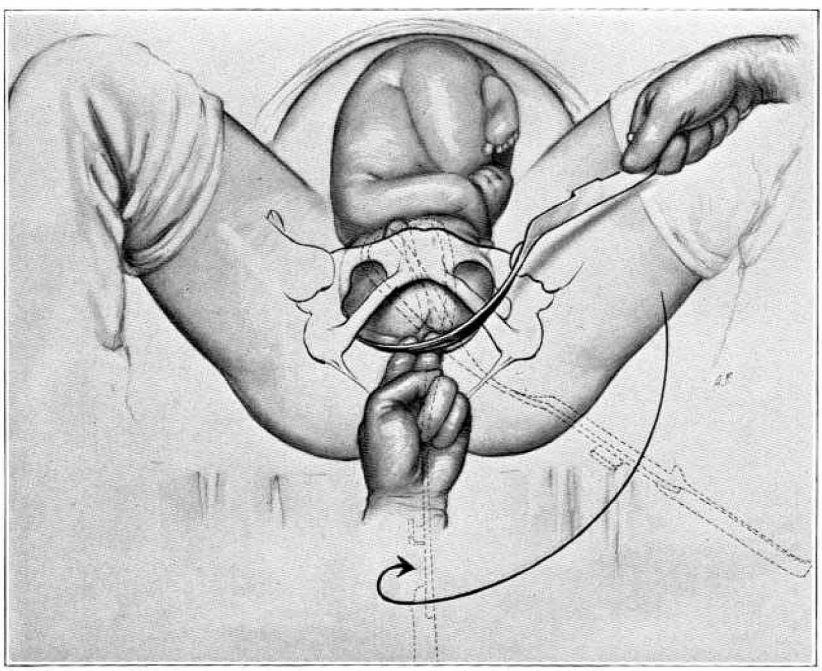

Fig. 12.

lock part of the shank rests firmly on the perineum (Fig. 4). The operator does not need the hand of an assistant to hold the handle of the anterior branch while the posterior branch is being introduced. The handle of the anterior branch should point downward and in the midline. At times, in high standing heads, the blade, after being rotated, lies somewhat to the side of the occiput, as shown by the deviation of the handle from the midline. A gentle push on the shank easily brings the handle to the midline.

The second blade of the forceps must be introduced posteriorly. The index and middle fingers of the left hand are introduced into the birth canal anterior to the posterior margin of the cervix. This branch of the forceps is held like a sword in the right hand and introduced posteriorly into the birth canal. The internal fingers guide the blade into place (Fig. 5). The handle of the posterior branch is introduced on that side of the anterior branch, in such a manner, that they will articulate without having to go through the awkwardness of recross-

ing. This can be predetermined by noting the side on which the lock is placed (Fig. 5). The posterior blade is gently introduced in front of the posterior margin of the cervix, into the birth canal, in front of or to either side of the promontory of the sacrum. At times, especially in contracted pelves, it may be difficult to place the posterior blade on as high a level as the anterior blade. Kielland states that the posterior blade is the only one which may render application difficult. When the posterior blade does not glide in with ease, the tip of the blade, in all probability, is pressing against the posterior wall of the pelvis. This shows that the handle of the blade is held too high, or the tip of the blade may be pressing against the head of the child, indicating that the handle of the forceps is too low. By elevating or depressing the handle of the posterior branch of the forceps, the operator will find the exact position where the tip of the posterior blade will slide into place without meeting the obstruction of the posterior wall of the pelvis or the baby's head. Force should never be employed to overcome this resistance. Because of the sliding lock, the branches may be articulated, even though the blades are not on the same level. With the first traction, the blades of the forceps will adjust themselves and come to the same level.

When the branches of the forceps are articulated, the blades are in the anteroposterior diameter (Fig. 6). The blades must be applied symmetrically over the parietal bones of the baby's head. The operator feels for the sagittal suture and determines its direction between the blades of the forceps which should be perpendicular to the sagittal suture. Traction is exerted downwards, in the direction in which the handles point. As the head descends in the birth canal, there is a tendency towards spontaneous rotation. The head can be rotated at will with the Kielland forceps but this is hardly necessary, as spontaneous rotation will take place when traction is exerted. However, at times it is desirable to rotate the head in the widest part of the pelvis, so that the sagittal suture comes in relation with the anteroposterior diameter before the head is pulled below the ischial spines. When one finds that the head does not rotate spontaneously, the head is rotated 90° from the transverse to the anteroposterior diameter of the pelvis. When the forceps is used as a rotator, traction should not be exerted simultaneously. The forceps are articulated, held securely, and rotated in the axis of the handles (Fig. 7). Some pelves will not permit a spontaneous rotation of the head and rotation must be performed by the operator, using the forceps as a rotator. When the head is rotated so that the sagittal suture lies in the anteroposterior diameter of the pelvis and is near the pelvic outlet, the blades of the forceps lie in the transverse diameter of the pelvic outlet (Fig. 7). When the head appears at the outlet, one is tempted to elevate the handles of the forceps, as is done with the classical forceps. The handles have a more downward direction than those of the classical forceps. If the handles of the Kielland forceps are elevated, the tips of the blades will slip up to the temporal regions from the cheeks of the child. Consequently the operator must exert traction only in the direction of the handles of the forceps and follow the direction given to them by the change in the position of the baby's head, as it appears under the pubis. (Figs. 7 and 8.)

In applying this forceps, it is necessary that the anterior branch of the forceps must be introduced first and rotated only in the direction of the concave margin of the blade, using the knob-like elevation on the handle as a guide.

Kielland does not consider it of much importance whether the right or left hand is employed to introduce the blade of the forceps. Like most men, who used this instrument, I always employ the right hand to grasp the handle of the forceps and the left hand as the internal guiding hand.

In occiput posterior, the forceps are held before the external genitals, as one would desire them in the birth canal, with the concave margins of the blades towards the leading point of the head, which is the occiput in the posterior posi-

tion either right or left. (Fig. 9.) As the leading point in right occiput posterior, is directed to the right and posteriorly and the forceps are held with the concave margins in that direction, the left blade would be uppermost and therefore the first to be introduced. The left blade is introduced in the same manner as described above, under the symphysis and is then rotated into place, and pressed gently to the right side of the pelvis, in order that the blade lies on the lateral aspect of the baby's head, with its concave margins to the right and posteriorly.

The right or second branch of the forceps is introduced posteriorly, but is directed to the front and somewhat laterally to the left sacroiliac synchondrosis. When the branches of the forceps are articulated, the lock is directed to the right and posteriorly. The blades in biparietal application are virtually upside down, that is, the convexity is anterior and the concavity posterior. (Fig. 10.) The branches of the forceps having been articulated, the handles are grasped firmly and the head is rotated with the forceps about 90°. The forceps being almost straight, rotation and extraction can be performed without removing and reapplying the blades, as is done in a Scanzoni maneuver. The forehead is brought to the left side somewhat posteriorly, and with subsequent traction (Fig. 11), the remaining rotation is brought about spontaneously.

In face presentation, as has already been mentioned, the Kielland forceps can be used to great advantage, not only when the chin is anterior, but even when it is directed more or less posteriorly, in which case, classical forceps are almost useless and contraindicated. The blades are applied in the same manner as in a vertex presentation, using the chin instead of the occiuput as the leading point. In the application, traction and rotation, one follows the same method as in an occiput posterior. Since the chin is considered the leading point, the concave margins of the articulated forceps are directed towards the chin.

SUMMARY

1. The operator must make a thorough examination and must accurately orient the baby's head, especially the leading point, be it occiput or chin.

2. The operator must determine which branch of the forceps is to be introduced first, using the concave margin as a guide when the articulated forceps are held before the external genitals in the position they would assume in a biparietal application.

3. The anterior blade is introduced first.

4. Rotation of the anterior blade is done according to a definite rule.

5. The posterior blade is the second one introduced, and enters posteriorly in the birth canal.

One who wishes to employ the Kielland forceps in obstetrical practice, should first acquaint himself with its use of a fetal skull in a bony pelvis, trying the different positions of the head, high, medium and low, with the occiput anterior, oblique and posterior and in face presentation. In this way the operator will be able to visualize the position of the forceps as they are applied to the baby's head *in utero*.

In medium or low forceps, Kielland recommends especially for beginners, the traveling or migrating method of application. The tips of the fingers are introduced into the birth canal, and placed on the sagittal suture, or better still on the anterior fontanel. (Fig. 12.) The handle of the anterior blade of the forceps is held like a sword, with the cephalic concave surface directed somewhat upwards.

While holding the anterior blade as just described, this is introduced along the fingers of the left hand towards the sagittal suture or anterior fontanel. The lower edge of the blade rests on the guiding fingers and the tip is directed towards the lateral wall of the pelvis. The handle is brought towards the under surface of the thigh and while the handle is pressed towards the thigh it is simultaneously depressed in the same direction as the hands of a wall clock (Fig. 12.) While the handle is depressed, the blade is pushed with the internal fingers upwards, under the symphysis pubis. The branch of the forceps is then in place, when the handle points directly downward and hangs free from under the symphysis. The handle should be pointing downwards toward the anus. (Fig. 12.) The posterior blade is introduced to that side of the anterior blade which will permit locking without crossing the blades. It is introduced posteriorly in the same manner that the posterior blade is introduced in the previously described technic.

In the medium or low forceps, according to Heidler, the migrating or traveling method of application may be used which is similar to the cephalic application of the classical forceps. In the application of the classical forceps, the posterior branch is introduced first and the anterior branch is introduced second. Contrary to this order of introduction, the anterior branch of the Kielland forceps is introduced first and the posterior one is introduced second. Heidler advises the introduction of two fingers into the birth canal which are directed posteriorly and laterally behind the baby's head. The anterior branch of the forceps is introduced along the guiding fingers and the blade is permitted to migrate anteriorly to the side of the baby's head. The blade is carried more anteriorly than it is in cephalic application of the classical forceps, so that they rest directly in front of the symphysis pubis. The posterior or second branch may be introduced directly posterior.

COMMENTS

There cannot be any doubt that the advantages that Kielland claims for his forceps are convincing to one who uses this instrument. It is easy to apply them and application can be made over the biparietal diameter. Lying in the long ovoid of the baby's head (in the occiput-mental diameter) the blades grasp the head over a greater area and consequently during traction the forces of compression are distributed over this greater area and so this instrument will be less harmful to the head than when only the tips of the forceps grasp the head. The tips of the Kielland forceps reach to the cheeks where the only injury that might be caused by pressure would be a facial palsy which is transitory, and there are not likely to be any intracranial injuries. These forceps do not prevent rotation of the head but rather facilitate rotation because of the perfect fit. For this same reason rotation is easier as the head is turned within the soft parts and the soft parts are not dragged along. The possibility of infection is less as the operator introduces only two fingers as a guide instead of the entire hand. In posterior positions introduction of the forceps is made but once instead of twice as in the Scanzoni maneuver.

Injuries to the maternal parts which are reported in literature, such as laceration of the bladder, uterus or introduction of the anterior blade between the cervix and the vaginal wall thus making a false passage, are largely avoidable if the blade is introduced cautiously.

During introduction or rotation of the blades no undue force should be used upon encountering the slightest resistance but rather the blade should be removed and the cause of the impediment determined. I am convinced that less muscular strength is required in the application of Kielland forceps than in any of the ordinary forceps. Brutal force and obstetrics are incompatible. Forceps should not be introduced or rotated during a pain. It is also to be emphasized that the Kielland application of the forceps is superior in a flat pelvis when the anteroposterior diameter of the pelvis is shortened and the head is standing transversely in the pelvis by shortening the biparietal (as previously noted), whereas if you use classical forceps and have them laterally in the pelvis, the occipitofrontal diameter is compressed and shortened while the biparietal is lengthened. This increases the obstacle at the short anteroposterior diameter of the pelvis. The anterior blade lying behind the symphysis pushes the head away from the pubis and the blade glides conveniently over the plane of the pubis. I was especially gratified with the Kielland forceps in three old primiparae, the first with a persistent occiput posterior where the forceps was applied upside down. It was surprising how easily the head lent itself to rotation and later extraction. The second was a face presentation. The third was an eclamptic having had one convulsion, the cervix not fully dilated, head in the transverse diameter of the pelvis having passed with the greatest circumference through the inlet. The dilatation was completed by inserting a Müller bag and then the regular Kielland technic was employed. A living child was obtained without any injury to the child or mother. However, on account of greater haste an episiotomy was performed. It should be noted that the shanks of the forceps lie over the anus and care should be taken not to infect them or the hands while grasping the forceps.

CONCLUSIONS

Tarnier forceps can be dispensed with as the Kielland forceps combined with episiotomy are more effective as an axistraction forceps. There is no injury to the baby's head other than a possible paresis of the facial nerve which is as a rule transitory. There are less injuries to the maternal parts. The Kielland forceps exacts from the obstetrician a correct diagnosis and therefore compels him to examine the patient carefully and develops thoroughness in his work. There is no objection to the use of this instrument by any one who is acquainted with the use of classical forceps provided he has been instructed on the manikin and has applied them on the living subject under the guidance of a trained obstetrician. The author would therefore advise training the younger men in the hospitals to its use. They should be cautioned against the dangers of applying any forceps without making a correct diagnosis as to the position of the fontanels and direction

of the sagittal suture. They will then realize that it is dangerous to apply classical forceps without a proper diagnosis and even more dangerous the Kielland forceps. Fully convinced of the merits of the Kielland forceps, I still cannot agree with the men who use this instrument on floating heads and on heads whose greater circumference has not passed the inlet. Such practice is always wrought with great danger even in the hands of skilled men. Above all, unless the accoucheur undertaking such an application is prepared to recognize and capable to cope with the dangers of complications that are likely to arise, he may sacrifice the lives of mother and child and besides this throw into disrepute this serviceable instrument.

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