

THE KIELLAND FORCEPS

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**I**N May, 1915, Christian Kielland of Norway presented a new type of forceps before the Munich Gynecological Society. Since that time a large number of papers have been written and many discussions have arisen regarding the forceps. The instrument has been hailed by some as the greatest advance in obstetrics in recent years while others have condemned it. The weight of evidence, however, is clearly in favor of the new instrument which differs from the ordinary type of forceps in the following respects: It is somewhat lighter in structure, its lock is not fixed but is sliding in character, and it has only an extremely small pelvic curve. The shape of each blade resembles that of a German bayonet. (See figures.)

The blades of the new forceps can always be applied to the biparietal diameter of the fetal head, hence these forceps are particularly adapted to the cases where the head is high and the sagittal suture runs transversely. For such cases the axis-traction forceps were devised many years ago but the disadvantages of this instrument are many. Kielland believes that the difficulties encountered with the axis-traction forceps are not ascribable to the pelvic contraction but to the incomplete rotation of the head. In most of the cases where the head is high in the pelvis, when the axis-traction or the ordinary forceps are applied, one blade comes to lie over the occiput and the other over the brow and face. The blades do not fit the head properly. Only the tips really touch the child's head while the remaining portion stands away from the head. Because of this, the circumference of the object of expulsion is enlarged and extensive lacerations result. Not only extraction but also rotation is made very difficult by such an application. When rotation is performed the vaginal mucosa moves with the forceps and suffers much damage. Difficulty in rotation may occur not only when the head is in high, but also in deep transverse arrest.

To overcome these difficulties, Kielland devised the new type of forceps and also a new method of applying these forceps. He lays down the following rules for the application of his forceps to a head which lies in the transverse diameter. (Kielland does not give advice on the use of his forceps in cases where the occiput is anterior.)

Before applying the forceps a correct diagnosis must be made regarding the station of the head, the direction of the sagittal suture and the position of the large and small fontanels. Before applying the forceps they should be held in front of the vulva in the position they are to assume in the pelvis. The slight pelvic curve of the instrument is to face the occiput. The blade which is to lie anteriorly and which, therefore, is to lie between the symphysis and the fetal head must always be inserted first. Two fingers of one hand are placed on the head under the anterior lip of the cervix. The other hand inserts the anterior blade with the concave surface of the cephalic curve facing the symphysis, horizontally along the fingers in the vagina until the tip has passed the symphysis. The handle is then depressed and the blade carefully pushed up into the uterine cavity. When high enough, it is rotated on its long axis 180 degrees, in the direction of the pelvic curve of the blade. To avoid confusion there is on each

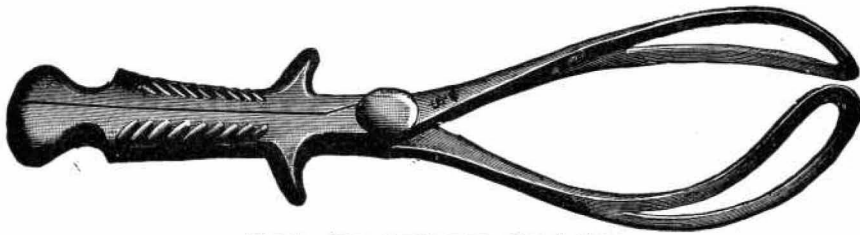


Fig. 1.—Naegele forceps. Front view.

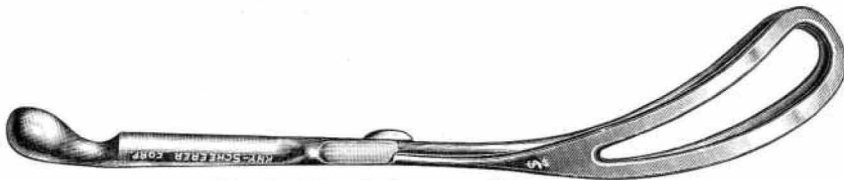


Fig. 2.—Naegele forceps. Side view.

handle a small knob which indicates the direction in which rotation is to take place. To apply the posterior blade, two fingers are inserted to locate the cervix and the blade is inserted either in front of, or slightly to one side of, the promontory and to that side of the first blade which will favor locking without the necessity of crossing the blades. When the blades are locked, the forceps grasp the head symmetrically in the biparietal and bimalar diameters. The introduction of the blades, especially the anterior one, is usually accomplished with amazing ease and always, according to Kielland, without injury. At autopsy on two women delivered with the new forceps no injury to the uterus was found. Since the forceps are applied symmetrically they do not tend to slip and rotation of the fetal head can be accomplished without injury. These forceps, however, should not be used to overcome definite cephalopelvic disproportion or a rigid perineum. When there is resistance to the insertion or to rotation of the anterior blade the latter should not be forced into place but should be inserted as the old forceps are, that is, the blade should be made to wander into place. It may be difficult to insert the posterior blade as high as the anterior one, especially in contracted pelvis but this does not

cause trouble; for these forceps may be locked even when the blades have not been inserted to the same height. During the first traction the blades become symmetrical.

After being locked, the blades lie in the anteroposterior diameter of the pelvis. Traction should be made in the direction of the handles more posteriorly than anteriorly. When this is done the head rotates spontaneously. One may with the forceps completely rotate the head anteriorly in the pelvic cavity before making traction. Rotation should be accomplished without simultaneous traction. At the outlet the handles should not be elevated as one is tempted to do because of training with the old forceps. The application of these forceps for brow and face presentations is the same as for occiput presentations. Since the chin is the point of direction in face presentations, the pelvic curve of the forceps must be made to look toward the chin.

The advantages of the new forceps and the new method of applying them are, according to the inventor, first the ease with which the forceps are applied regardless of the station of the head and the direction of the sagittal suture. The head is not displaced when the blades are inserted. The forceps cannot possibly slip off the head and the

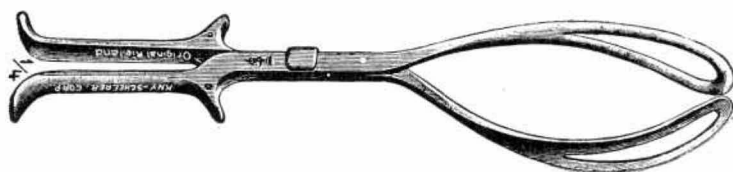


Fig. 3.—Kielland forceps. Front view.



Fig. 4.—Kielland forceps. Side view.

grasp is harmless to the child. The application is not only symmetrical but also ideal and remains unchanged during traction, which can be made in the direction of the handles. The blades are applied to that part of the child's head which can best endure pressure, namely the cheeks and the underlying bones. There is no pressure on the skull, orbit, brow, nose, neck or facial nerve as so often occurs when the old forceps are applied to an unrotated head. Because the blades fit the head exactly, this instrument is safe for rotation purposes. Likewise these forceps may be used when the cervix is incompletely dilated with much less damage than the classic forceps. Finally, due to the symmetrical application of the blades on the head, extraction is attended with much less force than is necessary with the other types of forceps.

From 1908 to 1915 Kielland with his forceps delivered 352 women, of which 197 were primiparas. In 302 cases the sagittal suture was in, or almost in, the transverse diameter. There were 5 brow and 6 face presentations. One mother died but she had had an infection before delivery. There was not a single third degree laceration or tear of the bladder or anterior vaginal wall. One child was stillborn

(premature), two children died soon after delivery (one brow and one face in primiparas), and two died on the third and fourth day, respectively. (Their mothers had contracted pelves.) The fetal mortality, therefore, was 1.4 per cent.

The first to seriously undertake an investigation of the Kielland forceps was Saenger in Doederlein's clinic in Munich. In 1916 he reported the results of his experience in 42 cases, among which were 32 primiparas and two with deflection attitudes (one face and one brow presentation). One mother died of eclampsia and on postmortem examination the uterus showed no evidence of injury. One child was born dead, but no heart tones could be heard before delivery. A second child died of hemorrhage from the cord one and a half hours after delivery. Autopsies on both failed to show intracranial lesions. Saenger applied the forceps as Kielland advised and experienced no difficulty except in one case. He was very enthusiastic about the forceps and claimed that not only was delivery much easier than with the old forceps, but both time and anesthesia were saved because there was less damage for repair.

Hamm in 1917 in a paper on the comparison of the forceps as an instrument of rotation and the method of combined rotation of the fetus into an occiput presentation as advocated by Fehling, advises in anomalies of presentation and attitude where the head is not engaged, that the combined method of rotation be performed. If this procedure fails the Kielland forceps should be applied, but they should be used by specialists only.

In the same year Rosenfeld demonstrated the new forceps before the Obstetrical and Gynecological Society of Vienna and recommended them very highly. In the discussion which followed the demonstration, Schauta said that the rotation of the anterior blade in the uterine cavity was dangerous and was only to be done by a master in obstetrics. He said that this procedure alone was sufficient to condemn the new instrument since forceps are to be used by the general practitioner. The only use he could see for this instrument was in cases of high transverse arrest in face presentations. Halban claimed the Kielland method of inserting the anterior blade was anatomically correct and should be tried a sufficient number of times before it was condemned.

In 1919 Küster reported 19 cases in which the Kielland forceps had been tried. Later, before the Breslau Gynecological Society, he reported the results in 22 cases. So enthusiastic was he that he acclaimed the new type of forceps as the most important advance in instrumental obstetrics in recent years. Among his cases were one forehead, one brow and one face presentation. Küster advised removal of the old type of forceps and the axis-traction forceps from the hands of practitioners and their replacement by the Kielland instrument. In the discussion of the second paper, L. Fraenkel spoke favorably of the new instrument but preferred the forceps he himself devised. Küstner could see no danger in the use of the Kielland forceps but urged that they be used by specialists only.

In June, 1919, Stroeder demonstrated the new forceps before the Hamburg Obstetrical Society and praised them very highly. At about the same time, Puppel proclaimed the advantages of the instrument

before the Medical Society of Mainz and said it was the obstetric forceps of the future.

Five years after his first presentation, Kielland again spoke before the Munich Gynecological Society. At this time Saenger reported that the total number of cases in which the Kielland forceps had been used was 60. There was no maternal death. The fetal mortality was 3.8 per cent but no baby showed intracranial hemorrhage. Since 1915 Saenger has used no forceps other than the Kielland, and recommends them not only for the specialist in obstetrics but also for the general practitioner. In the discussion, Doederlein confirmed what Saenger said about the results in his clinic. (However in June, 1923, I heard Doederlein say that as far as his own experience with the Kielland forceps was concerned he was not prepared to venture a definite opinion.) Mueller pointed out that the Walcher position is a valuable adjunct to the use of the new instrument and Adler maintained that its employment made no technical, but only diagnostic, exactions from the obstetrician.

Stoeckel in his Textbook of Obstetrics (1920) mentions the Kielland forceps but does not feel there has been sufficient experience to permit the general practitioner to use them.

In November, 1920, Meumann spoke before the Leipzig Obstetrical and Gynecological Society on the subject of high forceps in contracted pelvis. He reported that in Zweifel's clinic during the previous two years the Naegele forceps had been given up almost entirely in favor of the Kielland forceps in cases where the head was high. The results were very favorable. Only one child died; but an attempt had been made to deliver this baby with the Naegele forceps before the new forceps were applied. Meumann believes the new instrument is the best there is for high heads, but emphasizes that an accurate diagnosis is necessary before applying the forceps. In threatened rupture of the uterus the typical Kielland application should not be used, but the blades should be made to wander into place. Meumann also believes that before cesarean section is performed an attempt may be made to extract the child with the new forceps without harm to the child. Only specialists should use these forceps. Klien, in discussing this paper, expressed the belief that for high heads the Kielland forceps places all other forceps in the shade. Hodiesne saw advantage of the new instrument in flat pelvis because it diminishes the biparietal diameter of the baby's head. Schweitzer told of the very good results obtained with these forceps in cases where perforation had been the only other alternative.

Sachs called attention to what he believed to be a source of danger in the use of the Kielland forceps. He had been getting very good results with the new forceps but in one case where the head was high the cord was included in the grasp of the forceps. A quick delivery saved the child. Such an occurrence, Sachs believes, cannot always be prevented when using the Kielland forceps; hence the heart tones should be carefully controlled after the application of the forceps.

In 1921, Hoffmann reported his results in six cases and was very enthusiastic about the new instrument. He had also used it in the low cervical cesarean section with excellent results. One patient, who was delivered with the Kielland forceps because of pneumonia, died of the pneumonia and autopsy showed the uterus to be intact.

In his monograph on Diagnostic and Therapeutic Mistakes in Labor, and Their Prevention (1921), Fehling warns against the use of the Kielland forceps which he claims are difficult to apply and will do more harm than good. However, Fehling evidently had not been using the Kielland forceps for he speaks of a three-bladed instrument whereas the Kielland instrument has only two blades. In a review of this book Loeser emphasizes Fehling's objection to the Kielland forceps without correcting Fehling's error regarding the number of blades.

Berecz reported the results obtained with the Kielland forceps in Toth's clinic in Budapest. The forceps were used in 26 cases and were applied in the way the old forceps are applied. No mothers were lost and only one baby was born dead, but its heart tones could not be heard before delivery.

In 1921, Riediger presented his results in 29 cases, in six of which the head was floating at the time of delivery. So well pleased was Riediger that he believes the Kielland forceps not only replace the classic forceps but they also extend the field for the use of forceps. In the discussion of this paper, Benthin claimed that the Kielland forceps were better than the old forceps only when the head was high. Fink reported success in three cases where the head was not engaged but in one case he had to replace the Kielland forceps by the Naegele. Schroeder heartily recommended the new instrument as he never had any failures with it.

Mayer related very successful results with the Kielland forceps in 13 instances where the head was above the spines. All the children were born alive, but in two cases there were extensive tears in the vaginal mucosa. This, Mayer emphasizes, might have resulted from the use of the classic forceps. Mayer believes that the fear of rotating the anterior blade in the uterus is unfounded. He advocates the use of these forceps for specialists only and where the pelvis is normal, especially when the head is high. If, however, forceps are applied in contracted pelvis more can be expected from the Kielland instrument than from the old type of forceps. When the outlet is contracted, the new forceps are definitely superior. There should be no extension of the indications for the use of forceps, but the Kielland forceps can be used very successfully in anomalies of flexion and station of the fetal head, cases where the classic forceps are unsatisfactory. In discussing this paper, Kupferberg said that he had obtained very good results with the new forceps in 40 deliveries and that he uses the new instrument for all types of cases. He believes it should be the only type of forceps extraction taught to students. Fehling opposed the new instrument because it widened the field for forceps operations. He believes it should be used only in hospitals. Opitz said he had not found it necessary to use the new forceps and feared that because of them, high forceps operations would again become frequent. He agreed with Schauta that the only indication for the Kielland forceps was a face presentation where the head was high.

In 1922 at the biannual meeting of the German Gynecological Society held in Innsbruck there was quite a discussion on the Kielland forceps. Rosenfeld presented the results of a study of 135 cases in which the Kielland forceps had been used. The Kielland application

was employed and delivery in nearly all the cases was very easily accomplished and without any damage. All the babies were born alive, but four died postpartum (3 per cent). No baby or mother showed marked injury. Rosenfeld also used the new forceps to hold the head in three cases where perforation was necessary, and then extracted the perforated heads very easily without a cranioclast. He has used the new instrument for five years and believes it should be in the hands of every obstetrician and its application should be taught in every clinic.

A second paper read before the German Gynecological Society on this subject was by Krull, who reported the results in 93 cases. Sixty-three were his own, while 24 were those of his former assistants, Tittel and Rössler. In almost half the cases the pelvis was contracted. The typical application was used in most cases and in one case the cord prolapsed as the anterior blade was rotated. The child was delivered alive. One woman died of eclampsia and at autopsy the uterus showed no injury. Krull believes the Kielland forceps are very good for purposes of rotation and will pull the head through the pelvis with little damage. The instrument supplements the old forceps but should be used by specialists only.

A third paper read at the Innsbruck meeting was by Hoffmann, whose experience is based upon 116 cases and who believes the Kielland forceps render delivery easy, particularly in flat pelvis where the head is high. Hoffmann believes the new forceps diminish the biparietal diameter, and hence decrease a cephalopelvic disproportion. The application of the anterior blade, as advocated by Kielland, is not more dangerous than ordinary version. The Kielland forceps are excellent and harmless for rotation, only one application being required even for rotation of 135 degrees; hence the Scanzoni maneuver is made unnecessary. Hoffmann believes the new forceps should be the only type of forceps taught to students. Since the introduction of the Kielland forceps in the Dortmund clinic there has never been a need for any other forceps.

Still another paper read at Innsbruck bearing on this subject was by Weinzierl. He discussed the treatment of high sagittal arrest of which he collected 18 cases from 9000 labors. Nine of the 18 cases were delivered by forceps of which seven were by means of the Kielland forceps (4 pos. pub. and 3 pos. sac.). In only 3 of the 7 cases were the pelvis normal, and in all but one the head was movable above the inlet. In each instance the blades were easily applied to the sides of the baby's head and the head was rotated to the transverse position easily. On the pelvic floor the head was again rotated, to an anterior position. In two cases there was difficulty due to pelvic contraction. Two babies were born dead, but the other children and the mothers were uninjured. Weinzierl believes the Kielland forceps are very useful and in contracted pelvis advises their use in conjunction with symphysiotomy. In a later paper he reported two additional cases of high sagittal arrest in which the new forceps were used.

A lively discussion followed the presentation of the above four papers at the Innsbruck meeting. Eisenreich related that he successfully delivered with the Kielland forceps three patients after the Naegele forceps had failed. Hammerschlag praised the new instru-

ment but pointed out that, occasionally on insertion of the anterior blade, the head is pushed up out of the pelvis. Guggisberg insisted that the Kielland forceps were unnecessary when the head was low and that the forceps should be used only by specialists. Temesváry had used the new instrument 16 times, in 13 cases the head was high, and there was one face and one brow presentation. There was no injury to mother or child. Temesváry believes the use of this instrument should be taught to students. Puppel used the Kielland forceps five times. He claimed the instrument was somewhat difficult to apply but that rotation and extraction with these forceps were very easy. Saenger recommended that the forceps be used in cesarean sections and on the after-coming head. Zimmermann used the forceps six times but in three, because of a tendency to slip, he had to replace them with the Naegele forceps. Mayer remarked that the Kielland forceps can supplement the Naegele but not replace them entirely. It was the belief of Sellheim that a better forceps than the Naegele for normal pelvis was unnecessary, hence it was not a question of Kielland versus Naegele forceps but of Kielland versus Tarnier forceps. Sellheim obtained better results with the Naegele forceps in normal pelvis, and believes the Tarnier is better than the Kielland forceps in contracted pelvis. Stratz agreed with Sellheim that there is no need for a new instrument but he admitted he had never tried the Kielland forceps. On the other hand Baumm believes the new forceps are better than the Naegele when the head is high. Pankow also favored the Kielland instrument because it permits surprisingly easy rotation and extraction, but he wonders whether more ruptures of the perineal muscles might not result from this.

In an inaugural dissertation on the use of the Kielland forceps in Schmidlechner's clinic in Budapest, Lüps praises the new instrument very highly and believes it can be used on any head presentation regardless of its position, station or degree of flexion. He also advocates the use of the new instrument on the after-coming head. The Kielland forceps were used in seven troublesome cases but all the deliveries were easily accomplished. One mother died of eclampsia. Lüps believes the new forceps not only entirely replace the ordinary forceps but also save some babies from craniotomy. He recommends that their use be taught to students, as is being done in Toth's clinic in Budapest.

Meumann in a paper on brow and face presentations reports that in a series of seven forceps deliveries for brow presentations the only one which was easily accomplished was the one in which the Kielland forceps were used. In a series of 24 face presentations delivered instrumentally there was a fetal mortality of 50 per cent. This high mortality was due mainly to the use of the ordinary type of forceps which cannot be applied properly in these cases. The Kielland forceps on the other hand permit proper application and easy delivery. Meumann believes the use of the Kielland forceps will greatly improve the prognosis of both brow and face presentations.

In a later report by Meumann of sixty cases where the new forceps had been used, the pelvis had been contracted in forty and Meumann believes that at least twenty of the babies were saved from craniotomy by the new instrument. He emphasized that the anterior blade should be inserted only after the patient had been narcotized. In discussing



this paper Skutsch expressed fear of the Kielland application, and advocated inserting the blades as is customary with the old forceps. Thies agreed on the great value of the new forceps in certain cases but did not believe it was advantageous in face and brow presentations. He believed the forceps were too lightly constructed for cases where very forceful traction was necessary.

Bruch, who used the Kielland forceps 50 times, did not apply the anterior blade as Kielland recommended. He successfully delivered four brow presentations and one face presentation with the new instrument. In all of the 50 cases application, rotation and extraction were easy. Bruch recommends the new forceps to the general practitioner. He believes, however, that in generally contracted pelvises the Naegele forceps are better than the Kielland, because the generally contracted pelvis is too low to permit the proper application of the Kielland forceps.

In a second publication Mayer reported the use of the new forceps in 15 atypical cases where all the children were born alive. Mayer sees advantages of the Kielland forceps in three directions: namely, where there is a narrow pubic arch, where there is pelvic inlet dystocia and where there is an anomaly of cephalic flexion, (deflexion and asynclitism). The old forceps should not be used when asynclitism is present.

Zimmermann in a report of his experiences with the Kielland forceps in six cases, stated that he had three failures, and these he attributed to the weak construction of the instrument. The latter must be given a more extended trial before recommending it to the practitioner.

Mathes believes the chief advantage of the Kielland instrument is its ability to overcome bony resistance when the head is high and he cites an example.

In a paper read before the Berlin Obstetrical and Gynecological Society, v. Schubert reported the results obtained with the new forceps in Franz's clinic. Thirty patients were delivered and no mothers or babies were lost. Neither were there any severe lacerations. There were four anomalous flexion attitudes (face, brow, forehead and anterior parietal bone presentation). In one case the cord prolapsed upon insertion of the anterior blade but the child was delivered alive. Three high forceps deliveries were accomplished in three, four and two minutes respectively. v. Schubert warns against the possibility of making a false passage between the anterior lip of the cervix and the vaginal mucosa. He believes the Kielland forceps have made the Tarnier forceps obsolete and that they can be used with less danger in any case where any other type of forceps can be used. No more skill is required to use the new forceps than is necessary for the old forceps. In the discussion of this paper, Kielland said his instrument was not a universal one, and should not be used to overcome bony resistance. The new forceps do not diminish the volume of the fetal head, neither do they increase it. Carl Ruge II reported the results of twenty patients delivered with the Kielland forceps in Bumm's clinic. The results were excellent. Ruge calls the new instrument the forceps of the future and advocates their use by the general practitioner.

In the discussion of a third paper by Meumann read in Leipzig,

Zangemeister reported the first case of rupture of the uterus where the Kielland forceps were used. Sellheim claimed that applying the forceps in the anteroposterior diameter of the pelvis diminished the size of the pelvic cavity. He was opposed to recommending the new forceps to the practitioner.

In a still later paper, Meumann informs us that previous to the use of the Kielland forceps in the Leipzig clinic only 82.4 per cent of the high forceps deliveries were successful and only 60.8 per cent of the children were born alive. In the cases of high forceps where the Kielland instrument was used, 94 per cent of the babies could be delivered and 81.3 per cent of them remained alive. Slipping of the blades is impossible if the forceps grasp the fetal head properly. Meumann recommends the Kielland forceps not only for normal but also for contracted pelves, and also for the purpose of rotation.

Frey, speaking of the results obtained in Zürich, said the new forceps were so good that since their introduction the Naegele forceps had not been used. The new instrument was used in 75 cases. Guggisberg while agreeing with Frey on the advantages of the Kielland forceps when the head was high felt that the general use of this instrument would lead to a laxity in placing indications for forceps deliveries.

Bokelmann believes that a correct model of the old forceps can accomplish everything which the Kielland instrument accomplishes. For many years in dealing with transverse arrest he has been placing the anterior blade of the ordinary forceps directly under the symphysis without making it wander, even when the head was high. This gives an anteroposterior application exactly like that with the Kielland forceps and this application is easily carried out. Bokelmann believes the new forceps are especially adapted for face and brow presentations.

A comparison of 85 high Naegele and 43 high Kielland forceps deliveries was made by Hermstein. Among those delivered with the Kielland instrument one mother, who had cardiac decompensation, died. More extensive lacerations occurred in the series of Naegele forceps deliveries. Like Sachs, Hermstein had a case where the cord fell between a forceps blade and the fetal head when the Kielland instrument was used. He comes to the conclusion that the Kielland forceps are better than the Naegele forceps when the head is high. However, for their proper use obstetric knowledge and experience are necessary and an extension of the indications for high forceps operations is not to be fostered.

Heidler analyzed 100 cases delivered with the Kielland forceps in Kermauner's clinic in Vienna. There were 79 primiparas and of these 13 were over 35 years of age. In 53 cases the head was high, and in 13 additional ones it was barely engaged. In 67 cases the anterior blade was rotated in utero. Heidler points out that difficulty in rotating the anterior blade in the uterus is a danger signal and warns one against using forceps because the pelvis is contracted or the head is too high. Among the 100 cases were three brow presentations, six cases of asynclitism and one high sagittal arrest. Failures were encountered on an after-coming head, in two contracted pelves and in one brow presentation where the head was high. Nearly all the other cases were terminated with great ease. Of six maternal deaths

only one could be attributed to the Kielland forceps. In most of the primiparas an episiotomy had been performed; but despite this, there were extensions of episiotomy in 27 cases. Heidler, therefore, advises an extensive episiotomy before applying the Kielland forceps. A rupture of the uterus occurred in one of the patients in whom the application of the forceps was accomplished with great difficulty. Because the forceps could not be locked properly they were removed and reapplied, but again with great difficulty. Once more the blades could not be locked. Examination revealed the head to be free above the pelvic inlet. The posterior blade was removed without difficulty; but as the anterior blade was being withdrawn, resistance was met. This was forcibly overcome and the operator experienced the sensation that something had torn. To save the child, a rapid version and extraction were performed. Great difficulty was encountered in freeing the right arm and it was liberated only after fracturing the humerus. In the lower uterine segment a tear was found; so a laparotomy was performed and the uterus removed. The patient left the hospital on the twelfth day.

I feel that this accident should not be attributed to the Kielland forceps. In the first place the operator was warned twice by the extreme difficulty in applying the blades that the case was not one for forceps. Furthermore the sensation of a tear was felt, not upon the insertion but upon the removal of the anterior blade and only after much force had been used to overcome a definite resistance. To add to the *lapsus artis*, version and extraction were performed on a fullterm child in a ruptured uterus.

Heidler also reported a case of incomplete rupture of the uterus which occurred after craniotomy on a baby whose delivery had been attempted with the new forceps. There was a general fetal mortality of 9.2 per cent. From his experience Heidler believes that the Kielland instrument is a very definite advance in operative obstetrics and he considers it to be a universal forceps.

In a later article, Heidler reports 50 additional cases delivered with the Kielland forceps. Of these, 32 were high forceps and two were face presentations. The fetal mortality was 12.2 per cent and there was one maternal death which the author does not attribute to the forceps. Another case of laceration of the lower uterine segment occurred and here also there was a spontaneous recovery. While Heidler praises the new forceps very highly, he does not believe they cause less damage to the maternal soft parts.

In what he claims to be a critical review of the Kielland forceps based on the statistical reports of 32 authors, Fink condemns the new instrument. He maintains that the belief in the safety of the forceps has been shattered by Zangemeister's report of a case of rupture of the uterus. In his own clinic he saw at autopsy, two cases of injury to the posterior cervical wall. One of these patients had died of eclampsia. In the other, the author admits that the injury to the cervix was in a place where the head had caused necrosis by very long continued pressure. A similar necrotic area from pressure was found in the anterior cervical wall. Despite this, Fink attributes the injury and the death to the Kielland forceps. In one case, on insertion of the anterior blade, the head was pushed upward necessitating delivery by version and extraction. Fink had one case where the

forceps showed a tendency to slip and mentions a few other authors who had similar experiences. He also questions whether delivery can always be accomplished even if the forceps are properly applied, and cites three failures. In his cases 70 per cent suffered damage to the soft parts. He also challenges the supposed ease with which delivery can be accomplished with the new forceps and tells of one case where three individuals exhausted their strength in an attempt to deliver a patient. This patient delivered spontaneously a few hours later. He tells of another of his cases where two operators kept up a relay in an attempt to pull the head of a baby which weighed 4150 gm. (nine pounds two ounces) through the inlet into the pelvic cavity. (Such individuals evidently do not know the expression, "*Non vi, sed arte.*")

Twenty-four of Fink's 54 cases were high forceps deliveries. In the cases with normal pelves, the deliveries were accomplished with surprising ease and rapidity. In cases of cephalopelvic disproportion, Fink says, extraction may be so difficult that the strength of one individual may not be sufficient. Fink encountered lacerations of the vagina in a few cases in which he used the instrument for rotation purposes. However, he tells of a very easy rotation with the new forceps in a contracted pelvis where the Naegele forceps had failed. He does not believe there has been sufficient experience to permit an opinion on the use of the Kielland forceps in cases of cephalic deflexion (forehead 45 cases, brow 15 cases, face 15 cases).

Fink maintains that the Kielland forceps are unreliable, and has collected 15 cases from literature where delivery was accomplished with the Naegele and Tarnier forceps after the new forceps had failed. (Krull, Thies, Bruch, Mayer, Zimmermann, Sellheim, Baumm, Küster and Fink).

In Fink's series there were six maternal deaths but only two of these he attributes to the Kielland forceps. One of the latter patients died of sepsis; but she had a temperature of 101.6° before delivery and had had many vaginal examinations at home before admission to the hospital. The other death was the one to which reference was made above regarding the injury to the posterior cervical wall at the site of pressure necrosis. Another death in this series might be of interest. The cause of death was listed by Fink as heart failure; but before the patient died she was subjected first to an attempt at forceps delivery, then to a symphysiotomy which failed to permit delivery, and finally to a cesarean section. There were 11 fetal deaths but only three showed cranial or intracranial injuries at autopsy, and one of these three was the child of the patient who had been subjected to the multiplicity of obstetric operations. I might add that Riediger, in criticising Fink, said that when the latter first used the Kielland forceps, he applied them incorrectly and had to be shown how by an assistant. Riediger said that in a total of nearly 200 Kielland forceps deliveries performed by many operators at the Dortmund clinic, the results were excellent.

Very recently, Spitzer reported the results of five years' experience with the new forceps in 132 cases. In 59 the head had been high and it had been found movable above the pelvic inlet 40 times. In only 35 per cent had the cervix been completely dilated. Ninety per cent of the patients were primiparas and 65 per cent were over thirty years

of age. In five cases where craniotomy was necessary the Kielland forceps were applied and the head perforated. An easy extraction of the child followed in every case and made a cranioclast unnecessary. Spitzer makes the statement that in over 2,000 deliveries with the Kielland forceps no case of rupture of the uterus has occurred. He evidently had not heard of Zangemeister's case or Heidler's first report. Despite the lack of complete dilatation in most of Spitzer's cases and despite the fact that in these cases the cervix was not incised, very few cervical lacerations resulted. An episiotomy was performed in 90 cases and extension of tears resulted in 22; but it should be recalled that most of the patients were old primiparas and in almost half the head was not engaged. Two face presentations were very easily delivered. Two mothers died, one of sepsis for which indication the forceps delivery was performed, and the other of pelvic peritonitis which was also the indication for interference. The fetal mortality was 5.3 per cent but in reality only one fetal death was attributable to the forceps operation, despite the fact that 45 per cent of the deliveries were high forceps deliveries. Spitzer is convinced that such good results cannot be obtained with any other type of forceps.

At about the same time Hirschberg reported excellent results with the Kielland forceps in all types of head presentations and also in breech cases on the after-coming head. Babies which could not be delivered with the Naegele forceps were readily delivered with the Kielland forceps. Thirty-nine patients were delivered with the new forceps and in not one was there an extensive laceration. In two cases of prolapse of the cord, live children were delivered through definitely contracted pelves.

Winter, in a talk on forceps operations before the Northeast German Gynecological Society, pointed out the advantages of the Kielland forceps over the Naegele in cases of high transverse arrest, in unrotated face and brow presentations and especially on the after-coming head. In the discussion, Fink criticised the Kielland instrument while E. Schröder praised it.

The only mention of the Kielland forceps in the English language aside from abstracts of the foreign literature, is made in Williams' new edition of his Textbook of Obstetrics. Williams has never used the new instrument and expresses no opinion concerning it.

My own experience with the Kielland forceps is limited to twelve cases, of which five were high forceps deliveries. I did not use the Kielland method of applying the forceps but made the blades wander into place. Very good results were obtained in all cases but one, in which a vesicovaginal fistula resulted from a laceration of the anterior vaginal wall. However, in this patient two attempts to induce labor were made (bougie and bag) before results were obtained. At the time of delivery, after the patient had been in labor for two and a half days, her temperature was 102.6 degrees. The cervix was not completely dilated and had to be incised to permit delivery. The fistula healed spontaneously and both mother and child left the hospital in good condition. A second complication which I had was separation of the placenta by the posterior blade of the forceps. Profuse bleeding occurred. A live baby was delivered after

removal of the Kielland instrument, manual rotation of the head and the use of the Simpson forceps.

I feel that the Kielland forceps are distinctly helpful when the head is above the spines of the ischia, and also when the head is engaged, but where the occiput is not in an anterior position and cannot be brought into an anterior position manually. Where the head is engaged and the occiput is or can be rotated anteriorly, I believe better results can be obtained with the Simpson forceps. A disadvantage of the new forceps which I should like to point out is, that in making traction, the shafts of the blades press downward against the perineum, in consequence of which it is difficult to avoid contact with the anus.

#### SUMMARY

There have been 36 statistical reports concerning the use of the Kielland forceps in 1762 deliveries. In addition, 27 other individuals have expressed opinions about the new forceps and nearly all feel that the new instrument is a definite advance for delivering babies when the head is high and when the occiput is not in the anterior half of the pelvis. Most authors agree that the insertion of the anterior blade in the uterus is easily accomplished and without danger, and that maternal lacerations are less frequent than with the old types of forceps. The new forceps do not slip because there is an equal distribution of pressure all over the skull and the results for the children are very good. Rotation is easily accomplished and without damage. A biparietal application is always possible, the normal mechanism of labor can readily be imitated and less force is necessary for delivery. About half of the authors feel that the use of the forceps should be restricted to specialists in obstetrics. Of 61 individuals who have written or spoken about the Kielland forceps only six maintain that the new forceps are harmful or unnecessary. They are Schauta, Zimmermann, Sellheim, Opitz, Stratz and Fink. Schauta and Stratz never used the Kielland forceps and the others, except Fink, had very little experience with them. Fehling also opposed the new forceps but he spoke of a three bladed instrument.

Very recently Hiess in an article on high forceps operations expressed the opinion that the Kielland instrument was better than other forceps where high forceps were required. In the same issue Gäussbauer reported two cases in which the umbilical cord was torn by the anterior blade of the Kielland forceps. In one case there was profuse bleeding but the child was born alive. In the other case there was no bleeding but the baby was born dead. Gäussbauer does not believe these two cases should bring discredit to the Kielland forceps, because in his series of 80 cases, he had very good results. He does, however, caution against rotating the anterior blade in the uterus.

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