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## Sir Kedarnath Das Memorial Oration\*

### HISTORY AND EVOLUTION OF FORCEPS

by

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I am deeply grateful to the President and other members of the Bengal Obstetric and Gynaecological Society for the signal honour done me to deliver the Sir K. N. Das Memorial Oration this year. It would be my earnest endeavour to do justice to the Oration to the best of my ability. After a good deal of thought, it occurred to me that nothing could be a more appropriate and fitting remembrance to my late father than to discuss the very subject which was so dear to him and of special interest in his life, particularly in his later years, namely "History of Origin and Evolution of Forceps". This Oration is largely based on his book on this subject. My late father did not merely remain content with the academic aspect of the Obstetric Forceps

but also managed to acquire about 100 different varieties of forceps from all over the world with a view to obtain first-hand information regarding their construction and mechanics. These included the rare Chamberlen forceps. All these are now preserved in the R. G. Kar Medical College Museum along with many obsolete and rare obstetrical instruments.

It may not be out of place here to state what a colossal amount of labour my father had to put in for writing his book on "Obstetric Forceps", regarded as a classic and the most exhaustive and informative treatise on the subject written in any language. He had put in no less than twelve years of hard and solid labour, denying himself the rest and recreation he very badly needed. It meant reading, verifying and making notes of more than 1000 references in different languages, apart from collecting, and collating other materials. He

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wrote the whole manuscript all by himself, without the help of a typist and a stenographer or an assistant.

My late father designed a pair of forceps in 1912, mainly for use in Indian women, particularly Bengali women. This he did after taking measurements of pelves of many Indian women, particularly Bengali, and also measurements of more than 100 foetal heads (Fig. 1).

Two models of forceps are described—(1) an ordinary, and (2) an axis-traction. His forceps is a modification of Simpson's forceps and is known as 'Das's Forceps'. It is lighter and more delicate, weighing only one pound. The pelvic curves are a little more pronounced than usual and the distance between the shanks near the joint is wide enough to admit the forefinger. The handles are fashioned like those of an amputation knife and give an efficient hold. Moreover, being flat, they allow the thumbs to rest as a fulcrum effectively during the final stage of extraction. The shoulders are made small and act as finger rests.

In the axis-traction model the blades are fitted with detachable axis-traction rods with 'Down Brothers Registered Catch'. There is a butterfly nut to fix the handles. This forceps is an example of a pair of modern forceps in general use to-day.

The history of origin and evolution of the forceps is an extremely fascinating subject. No surgical instrument has given rise to so much controversy as the obstetric forceps. For proper evaluation and critical study the subject is best discussed under three periods, namely — pre-Chamberlen era, the Chamberlen era and the post-Chamberlen era — covering a period of nearly 6000 years, from dawn of civilisation to the present time.

Table 1 shows the 3 periods, namely — (1) pre-Chamberlen, (2) Chamberlen and (3) post-Chamberlen. The pre-Chamberlen period includes — (a) Egyptian Medicine, (b) the Hindu system of Medicine, known as Ayurveda — (c) Greeco-Roman Medicine, (d) Arabian Medi-

TABLE I  
Showing three periods

Year	Period
1. Pre-Chamberlen Period	
4000 B.C.	Egyptian Medicine
1500 B.C.	Hindu System of Medicine
460 B.C. to 1060 A.D.	Greeko-Roman Medicine
700 to 1069 A.D.	Arabian Medicine
1554 A.D.	Jacues Reuff (? Forceps)
2. Chamberlen Period	
1580 to 1702 A.D.	Forceps invented (1601)
3. Post-Chamberlen Period	
1720 to 1969 A.D.	From Palfyn to recent times.

cine and the subsequent period up to 1554 A.D.

In *Egyptian Medicine* there is no mention about labour in papyrus Ebers, the earliest medical record of Egypt (1500 B.C.).

It is in *Ayurveda*, the Hindu system of Medicine that we find for the first time in history mention is made about labour and the rules regarding its management. In this respect it has the greatest significance. The three great authors of this system are Sushruta, Charaka and Bhagabata. They have described several surgical and obstetrical instruments. In the latter are included, among many others, three types of instruments, an earliest account of accoucheur's armamentarium.

(1) Mandalagra—It is essentially a knife or a sharp-cutting instrument.

(2) Garbha-Sanku—Womb hooks — both sharp and blunt. They were used as traction hooks.

(3) Jujna-Sanku — believed by many to be forceps. According to Das it is a paired hook for delivery of a dead child.

It is well-known that the ancient Hindus practised craniotomy and embryotomy on the dead foetus.

The *Greek school*, founded by Hippocrates, does not mention any forceps-like instrument. It mentions that if delivery with the hand failed, it should be effected with hooks. This holds good for the whole of the Greco-Roman period. They practised cephalic version. Embryotomy was performed as a last resort.

It is interesting to note in this connection that in the early part of the present century, an ancient marble

bas-relief has been found near Rome, depicting a birth scene (Speert, 1958). In it an accoucheur is seen holding a forceps-like instrument. The date of the tablet has been fixed as 2nd or 3rd century A.D., the whole tablet measuring 2½ ft. by 1½ ft. No other information is available on this tablet. Under the circumstances one has to leave it for future study and comment by some one interested in forceps.

Next, we come to the *Arabian physicians* (700 to 1069 A.D.). The three outstanding physicians were Avicenna, Albucasis and Rhazes of Baghdad. It seems Avicenna might have been conversant with the use of forceps or forceps-like instruments to deliver a live child. This is based on his statement "that if a fillet applied to the head fails to bring it out, then forceps are to be applied and the child extracted. If this cannot be accomplished, the child is to be extracted by incision as in the case of a dead foetus".

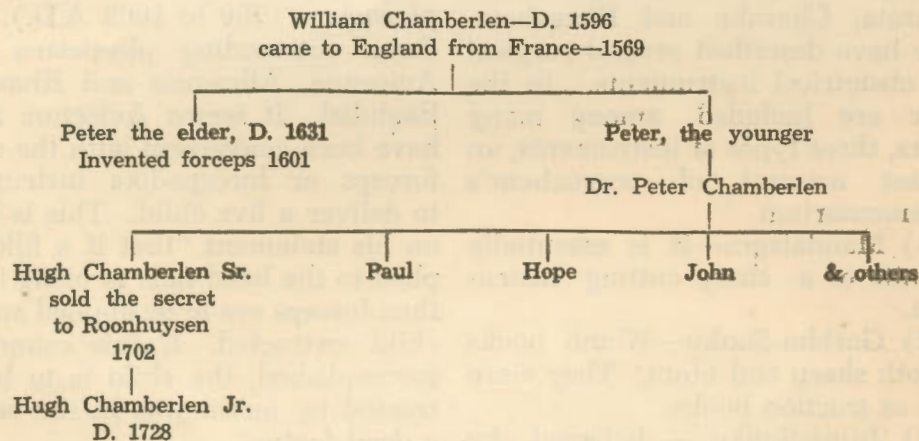
This statement by Avicenna is accepted by many as a proof of the existence of forceps for the delivery of a live child. Unfortunately, neither any description of the instrument nor the existence of an actual instrument has been reported.

In 1554, *Jacques Reuff* of Zurich described an instrument for the delivery of a child, called by him forceps Long et Tarsa (Fig. 3-1). The whole instrument measured 6 inches in length. Possibly in practice it was used for removal of bladder stones. It appears that at the present state of knowledge it is doubtful whether any instrument like the obstetric forceps of to-day ever existed during the

pre-Chamberlen period, contrary to occasional claims from time to time. It is in the Chamberlen period that the obstetric forceps were invented by a member of the Chamberlen family. This period lasted from 1580 A.D. to 1728 A.D. The history of this gifted family is full of interest, but confusing. For a long time it was not known as to who actually inven-

1601, was also named Peter—known as Dr. Peter Chamberlen. For a long time it was believed that this Dr. Peter Chamberlen was the inventor of the forceps. Subsequent investigations have proved beyond all dispute that it was Peter the elder who, round about 1601, invented the forceps, the year in which Dr. Peter Chamberlen was born (Table II).

TABLE II

*The Chamberlen Family*

ted the forceps as it was kept a closely guarded family secret. The difficulty was further aggravated by the similarity of names among themselves, such as Peter and Hugh.

*Chamberlen Family*

William Chamberlen, the founder of the family, was a French Physician who fled from France in 1569. Two of his four sons, named Peter the elder and Peter the younger, studied medicine and devoted a large part of their practice to midwifery. Peter the elder died in 1631. Peter the younger was born in 1572 and died in 1626. He was survived by several sons, one of whom, born in

Dr. Peter Chamberlen died in 1683, leaving a large family, three of whom, Hugh (Sr.), Paul and John, became physicians and practised midwifery. Hugh Chamberlen (Sr.) went to Paris in 1670 and attempted to sell the family secret to Mauriceau, the celebrated French accoucheur, for 10,000 livres. But the deal fell through as Hugh Chamberlen failed to deliver a dwarf rachitic patient of Mauriceau, culminating in the death of the patient. Later, he went to Holland and sold the family secret to one Von Roonhuysen, an accoucheur, in 1702. Roonhuysen sold the secret to the Medical Pharmaceutic Society of Amsterdam, who in their turn sold

it to individual Licensees for a certain fee. It was found later that the so-called secret actually consisted of one blade only.

Hugh Senior died leaving a son, called Hugh Junior; who died in 1728 and with his death the biography of the famous Chamberlen family ended. It is said that the Chamberlens went to great lengths to preserve their secret for a long time. They arrived at the patient's house in a carriage of special design, with a huge wooden box which had beautiful carvings. The box was carried directly into the room of the patient, all others were excluded and the patient was blindfolded. It was generally believed that the box contained a complicated piece of machinery.

The finding of 4 pairs of forceps in 1818 (some say 1813) in different stages of development in a wooden chest in Woodham, Mortimer Hall, near Maldon in Essex, the country house of Dr. Peter Chamberlen family, settled the question once for all. The fourth pair was almost a perfect forceps (Fig. 2).

It is apparent that the Chamberlens must have made several successful attempts with various models until they succeeded in making the most perfect model.

Before we pass on to the next period, mention must be made of a pair of forceps supposed to have been used by Drinkwater, an Englishman, in 1668.

#### *Post-Chamberlen Period*

Though the Chamberlens are rightly hailed as inventors of the forceps, it was Jean Palfyn, a Belgian

who, for the first time in history, in 1720, demonstrated publicly a pair of forceps before a meeting of the French Royal Academy of Science (Table III).

TABLE III  
*Post-Chamberlen Period—Chronological Events 1720 A.D. to 1968 A.D.*

Year	Events
1720	Jean Palfyn—First public exhibition
1733	Chapman } First published report
1734	Giffard }
1747	Levret } Introduced pelvic curve
1751	Smellie }
1769	Johnson—added perineal curve
1781	Thenence—parallel forceps
1805	Uytterhovens—Anterior—posterior forceps
1850	Simpson—forceps & vacuum extractor
1879	Tarnier—Axis—traction forceps
1912	Das—Bengal forceps
1915	Kielland—Straight forceps
1925	Barton—Ant-Post. forceps
1950	Thierry's spatula
1968	Laufe—Divergent forceps

He showed what he called an "Obstetrical Tractor", composed of two spoon-like arms, which were unconnected and were utilised by placing one on each side of the head to act as "graspers". They were known as 'Les mains de fer' or 'Iron hands of Palfyn' (Fig. 3).

It is believed that Palfyn conceived the idea of his invention from the blunt hook with broad handles of Ambrose Paré. Instead of one he used two simultaneously. It is to Edmund Chapman of England that we are indebted for the publication of the Chamberlen forceps with description and picture in his book, "A Treatise on the improvement of Midwifery". A copy of this rare book is in my father's library in R. G. Kar Medical

College. Chapman showed a pair of forceps for the first time in England. According to Chapman, by 1733 the forceps were well known to all the principal men in the profession in England, both in town and country.

He, along with Giffard, was the first to report on the use and indications of forceps.

Perhaps the true contribution of Chapman was to recognise the value of forceps, to use them and to publicize them. Giffard also used a type of forceps (1734) very similar to that of Chapman. It appears that Dusee of France used a type of forceps which was described by Dr. Alexander Butler in Edinburgh in 1733. Chapman, Giffard and Dusee were contemporaries.

After this, several forceps were described both in England as well as on the continent. But, the most important modification was made by two men, quite independently of each other. They added the pelvic curve to the forceps, Levret in 1747 and Smellie in 1751.

Benjamin Pugh of Essex, England, conceived the idea of a pelvic curve in 1740 and actually used such a forceps. But he described his forceps in 1754. Levret modified his forceps in three distinct stages. It was in the second stage that the pelvic curve was added which he called "grande curve". The forceps of Levret were longer than Smellie's and possessed a more pronounced curve. Levret altogether made 6 different varieties of forceps.

William Smellie, described by Munro-Kerr as the Master of British Midwifery, not only increased the length of the forceps but quite inde-

pendently added the pelvic curve for two reasons, (1) to permit greater ease in application, and (2) to secure a satisfactory grip of the foetal head. He introduced the "English lock". Smellie had made both short straight forceps and long double curved forceps (Fig. 5).

His forceps were made of both 'iron' and 'wood'. At one time he used to cover the blades of the 'iron' forceps with leather, with a view to make less clinking noise during application and to minimise damage to the tissues. He changed the leather covering after each application to avoid venereal disease. Smellie was the first to apply forceps on the aftercoming head. He was also the first to perform rotation of the head with forceps. He insisted on a precise determination of the position of the head to permit a cephalic application. In Smellie's experience only 10 out of 1000 labours required forceps intervention.

In short, it was Smellie who laid down definite rules for using forceps and who taught the proper use of the instrument. He gave British midwifery the honoured position in relation to the instrument. He was a great teacher. Like all great men Smellie, too, had critics, belonging to both sexes. Their criticisms, sometimes very harsh, made him all the more great and immortal.

Wallace Johnson, a pupil of Smellie's described a type of forceps in 1796 with several minor modifications, the principal one being the addition of the "Perineal Curve".

Sir James Y. Simpson, one of the most remarkable personalities of his time, demonstrated a pair of forceps

before the Edinburgh Obstetrical Society on May 10th, 1848, which for a long time was very popular and gave great impetus to the use of forceps. His forceps formed the basis of several modifications, including those of Das, De Lee and many others. The Simpson type of forceps is still favoured by many.

For 130 years after the introduction of the pelvic curve by Levrét and Smellie no important modifications were made till Tarnier described his axis-traction mechanism in 1877. During this period more than 200 varieties of forceps, each having its own peculiarity, were described (Fig. 6).

Etienne Stephen Tarnier described his first model of axis-traction in 1877. In this connection Tarnier acknowledges the help of two collaborators, (1) Voillaire—a military ballistics expert, and (2) Collin—an artisan. Together they made 30 different models before Tarnier described his first model. Though Tarnier is credited with the development of axis-traction, earlier workers, like Hubert (1860) and Morales (1864), were aware of the fact that when traction was attempted on the head at high levels in the pelvis, the straight forceps or forceps with pelvic curve were unable to direct the line of traction in the axis of the birth canal and considerable force was misdirected against the symphysis pubis.

The development of axis-traction forceps has been very aptly described by Caldwell, D'Esopo and Moloy (1928) in four different groups (Fig. 7):—

1st group—Development of an

axis-traction which depends on tapes or flexible rods fixed either to the midpoint of the blades or the base of the blades, e.g. Van DeLaar (1777), Chassagny (1861), Laroyenne (1875), Tarnier (1877).

2nd group—Development of method of axis-traction which depends on rods fixed at right angles to the region of the shank, lock or handle tip. In this group, axis-traction is obtained by a rod fixed at right angle to the handle and the instrument in use is rigid. Hubert, in 1860, deserves the credit for introducing the first sound principle of axis traction, namely "the direction of traction must coincide with the line which constitutes the axis of the blades of the forceps". His forceps consisted of a rod fixed at right angles to the junction of shank and handle, and traction was applied at a point where the axis of the blade crossed the traction rod. The forceps of Hermann (1840), Hartman (1870) and Dewees (1900) belong to this group.

3rd group—In the third group, the traction in the axis of the pelvis is obtained by the use of an extreme double perineal curvature. Wallace Johnson, a pupil of Smellie, introduced the perineal curve in 1769. The forceps of Morales (1864), Aveling (1808) and Hubert (1877) employ this principle.

4th group—Development of axis traction by means of a single perineal curvature with the addition of axis-traction bars, fixed to the base of the blades, lock or tip of handle.

In the fourth group of axis-traction forceps, a somewhat different type of perineal curve is used. The

axes of the blade and handles are parallel and separated by a bend in the shank of the instrument. Tarnier's early model, Studley's (1882), Hawks Dennen's (1931) and Piper's (1929) forceps belong to this group.

By using an ordinary type of forceps without the use of tapes, bars, rods, etc., traction may be made in the axis of the pelvis by what is known as the Pajot's manoeuvre. It is also known as Osiander's manoeuvre. This was first suggested by Saxtorph 44 years before either was born.

Milne Murray's contribution to the axis-traction forceps is of great importance. He went into great details of the mechanical principles involved in it. His axis-traction forceps is based on Tarnier's principle.

The next most important modification was introduced by Christian Kielland of Norway. He described a pair of forceps in 1915 before the Munich Gynaecological Society which has several features not present in the usual type of forceps in general use. It is usually described as a straight forceps with very little pelvic curve. Strictly speaking it is not absolutely straight because the axis of the fenestrated blade lies a little below that of the shank. The shanks are superimposed with a sliding lock. At the beginning, it did not find much favour with most obstetricians and its use was mainly limited to Germany. After the wandering method was introduced it is being increasingly used all over the world. Parry Jones has written a special monograph on this forceps (Fig. 8).

Various modifications of the origi-

nal Kielland have appeared, such as Drosin, Liukart, Laufe—Barton and Moolgaokar.

Zweiffel, in 1927, described a universal forceps which could be used equally well in all planes of the pelvis. It has two almost straight blades with a minimum of pelvic curve.

Lyman G. Barton, in 1925, described a forceps which according to many can claim some originality. It belongs to a type of forceps known as antero-posterior forceps. This type of forceps was first described by Uytterhoven in 1805.

The most obvious difference between Barton's and the classical forceps is that the blades are curved on "side" instead of on "flat". Further, the anterior blade is hinged. It has no pelvic curve in the usual sense. But the posterior blade follows the curve of the sacrum. Its main use is application on the head in the transverse diameter of the pelvis.

Originally, Barton's forceps were intended for use without any attachment, but later on an axis-traction was designed which greatly increased its usefulness. It has a sliding lock which does not slide when the handles are approximated.

Uytterhoven's forceps, first described in 1805, were in all probability intended for crushing the head in the antero-posterior diameter of the pelvis. But with other antero-posterior forceps, like Baumer's (1849), Sloane's (1889) and others delivery of a live child is clearly possible.

These antero-posterior forceps are intended for use when the sagittal suture is in or near the transverse diameter of the pelvis.



Edward Piper, of Philadelphia, described, in 1929, a forceps for use on the after-coming head in breech presentation to reduce the foetal mortality during delivery. The characteristic features are (1) a shallow cephalic curve, and (2) a deep perineal curve. It has an English lock. Laufe has described a modification of the Piper's Forceps.

There is another type of forceps known as "Parallel Forceps". Jean Simon Thenance of France introduced these forceps in 1781. The chief feature of his forceps is that its branches are not crossed. The branches articulate by means of a hinge at the extremity of the handles. The blades are perforated in the middle by an opening through which a noose is passed to fix the branches. Several other parallel forceps have been described since then, such as Assalini (1811), Valette (1857), Hubert (1877) Poulet (1881).

Many new forceps described after 1950 are of the type of parallel forceps with no lock or a special type of lock. Apart from this, these recent forceps appear to be modifications one way or another of the forceps already described. These parallel forceps have been found specially suitable for rotation and extraction with a single application. A noticeable feature in the majority of these forceps is the absence of the axis-traction mechanism.

Thierry of France described a type of forceps in 1950 and named it 'Spatula' with no lock. It is a parallel forceps. Any one of the blades could be introduced first.

Morris Leff (1955) designed forceps for rotation of the head. The

special feature of the forceps is that the tips of the blades are shortened, making the blades 35-40 m.m. smaller than these of standard forceps. Leff forceps are lighter, the blades are narrower and possess less pelvic curve. Miseo (1956) devised a new obstetric forceps employing the principle of the split universal joint and satisfying the need for a universal obstetric forceps. It can be applied in all eight positions of the pelvis. The adjustable or hinged blade simplifies forceps application, particularly in the arrested occipito-transverse position, and compression of the foetal head is reduced to a minimum. The split universal joint transmits axis-traction force to the baby's head in any position.

Shute of Ottawa, in 1956, described a forceps based on the principle of parallelism with a special lock incorporated in the handle. Shute claims that his parallel forceps overcome the numerous disadvantages and defects of the traditional cross blade forceps. The main characteristic feature of his forceps is that the blades have been designed to grasp the zygomatic arches instead of extending up to the chins. The pressure exerted on the blades is rigorously controlled by a special micrometer screw in the lock which eliminates chances of trauma to the skull and brain of the foetus during delivery. Furthermore, it affords a 'helmet' protection to the head of a premature child (Fig. 9).

Mann (1957) described a parallel forceps with a special type of sliding lock for application in asynclitism. Philip Rhodes (1958), with a view to improve the design and utility of

forceps, has made some valuable practical suggestions with regard to various dimensions. These will be of great help in designing new forceps. Laufe, in 1968, described a divergent type of forceps with a pivot lock at the end of the handle. The blades are fenestrated inside but solid outside. It also has a perineal curve.

#### *Critical Review*

Like any other discovery of far-reaching importance one would suspect that the idea of the forceps, as we know them to-day, did not take shape in the mind of one person only and that, too, not overnight, though it seemed to originate from the Chamberlens mainly. Version was practised extensively by the ancient physicians, the Hindus, the Greeks, the Romans, and the Arabians. It was only when it failed to deliver a baby that embryotomy was resorted to even if the baby was alive. It is quite likely that deliberate destruction of so many live babies during an obstructed labour must have engaged their serious attention for a solution. At the same time it is hard to believe that the ancient physicians who had acquired such a high degree of proficiency in the medical science did not think of a conservative method of instrumental delivery of a child. In this respect, the statement of Avicenna, quoted earlier, is quite significant. But in a critical review, in the absence of a more authentic proof, one has no other alternative but to accede to the view generally held that forceps-like instruments were not known to them, however much one would like to give them

the credit for such a discovery. From evidences available, one would be justified to speculate that several persons may have tried two fillets or blunt hooks instead of one and were successful. A major advance was to cross them and to have a hinge at the point of crossing. This must be considered as a special contribution of the Chamberlens.

Jean Palfyn, it is presumed, was not conversant with the Chamberlen forceps and in all probability created a model independently. He used two spoon-like blades, a further modification of the blunt hook with broad handles like those of Ambrose Paré and Mauriceau.

Fundamentally, the obstetric forceps is a composite instrument made up of two branches. The branches may be crossed, parallel, convergent or divergent. Each branch in turn is divided into blade, shank, lock and handle. Each such part has been modified either separately or collectively depending upon an individual idea. As a result we have today over 600 varieties of forceps. But, surprisingly enough the original features of the Chamberlen forceps, invented in 1601, still form the basis of all obstetric forceps (Tables IV and V).

It is difficult, if not impossible, to count the exact number of forceps so far described. Kedarnath Das, in 1929, in his book published an account of no less than 550 different varieties, the last 54 in his list appeared between 1900 and 1929, and 38 of these are concerned with modifications of the axis-traction mechanism. A study of the evolution of forceps shows that there is a steady

TABLE IV  
*Classification of Forceps (Das)*

1. Historical or Chronological
2. Geographical or National
3. Dimensional—length of the instrument
4. Geometrical—Straight and curved
5. Dynamical—method and duration of traction
6. Blade Characteristical—
  - (a) Solid or fenestrated
  - (b) Divergent, parallel, convergent, crossed.
7. Functional—Extractor, Rotator, lever, etc.

TABLE V  
*Comparative Measurements of some Forceps*

Forceps	Widest dist. in c.m.	Distance bet. tips. c.m.
Chamberlen (1601)	8.0	2.1
Smellie (1748)	7.0	nil
Pugh (1754)	6.25	0.6
Denman (1786)	7.1	2.1
Simpson (Long. 1871)	9.5	2.9
Milne Murray (1891)	8.8	3.2
Das (1912)	7.5	2.5
Kielland (1915)	9.2	1.6
Barton (1925)	8.8	3.2

rise in the number of forceps from the beginning of the 18th century till the end of the 19th century. During the last quarter of the 19th century no less than 182 varieties of forceps were described, the highest in any quarter of a century. The advent of the 20th century saw a rather rapid decline in the number of new types of forceps. As far as could be ascertained not more than 20 new forceps have been added after 1929. It is more than likely that there may be a few more. This decline in the 20th century is due to the advent of caesarean section, at first classical and later on, the lower segment. These are resorted to in preference to high

and difficult mid-forceps operations with much better results, both maternal and foetal. (Table VI)

TABLE VI  
*Number of Forceps described in different Centuries*

Century	17th	18th	19th	20th	Total
Number	5	142	383	74	604

Generally speaking, four types of forceps were in use during the 18th century and the greater part of the 19th century, i.e., till the introduction of axis-traction by Tarnier in 1877, viz., (1) short straight forceps; (2) short double curved forceps; (3) long straight; and (4) long double curved. Many obstetricians during this time used to carry two or more varieties in their bags. As Munro-Kerr puts it, there was intimate friendship between the accoucheur and his pair of forceps.

For the first 150 years or so forceps were generally used as low forceps. Forceps during this period were applied to the sides of the pelvis without regard to the position of the foetal head, i.e., by pelvic method. After the addition of the pelvic curve round about 1750, high forceps operations were much in vogue, very often with disastrous results to the child and to the mother. As might be expected the technique of high forceps operations, particularly in the presence of pelvic deformity, posed a serious problem. This was solved only partially by the perfection of the axis-traction mechanism by Tarnier.

Regarding the position of the patient during forceps delivery, the dorsal position was usually favoured

as it was easy to apply forceps under the cover of a sheet out of view of the patient before the advent of anaesthesia. In England, on the other hand, the left lateral position was the position of choice. It was introduced by Wallace Johnson, a pupil of Smellie. According to Wallace, the lower blade should be introduced first and each blade should be passed into the hollow of the sacrum and rotated to the side of the foetal head. Now, the dorsal position is used exclusively all over the world.

The importance of locating the ear as a guide to the exact application of the blade, i.e. cephalic application, was realised and stressed by several men in the latter part of the 19th century.

An important function of the forceps is correction of the faulty position of the head, particularly occipito-posterior and deep transverse arrest. Many obstetricians in the 19th century realised this and even achieved success with the long single curved forceps. Smellie, it might be remembered, was successful after several failures in the correction of a case of occipito-posterior position with forceps. That was about 1755. Scanzoni, one hundred years later, in the middle of the 19th century, described his famous "double application method" which was practised for a long time with success. De Lee in the early part of the 20th century described his "key-in-lock" technique, a modification of Scanzoni. Both the methods are no longer used.

After the introduction of Keil-land's forceps, rotation of the head with forceps became easy, simple and popular. In fact, many modern

obstetricians now consider that rotation with the Kielland type of forceps offers easier and more scientific approach than manual rotation.

The pelvic curve introduced by Levret and Smellie was of great importance in the days of high forceps. Now, that the high forceps and difficult mid-forceps operations have been abandoned, and a generous episiotomy, eliminating the curve of the birth canal, is an essential part of forceps operation, much of its importance is gone. In fact many people believe that it is no longer necessary. This is very well reflected in the present day tendency to make the forceps straight or nearly straight, with no pelvic curve or very little pelvic curve. Examples of such forceps are Kielland, Zweifel, Smith and others. Such straight forceps are of great use not only for easy cephalic application but also for rotation. Another great advantage of the straight forceps is that all manipulations, like application, rotation and final extraction, can be accomplished without taking the forceps out and reapplying them, i.e. all in one application. A recent trend noticeable is to make the forceps parallel or divergent instead of the crossed blade type, such as Thierry, Leff, Mann, Shute and Laufe. Although maternal and foetal distress have remained constant indications, prematurity is a new addition. Another new indication is prophylactic forceps introduced by De Lee in 1920, when it was severely criticised by many. But with the passage of time since its introduction the indications for prophylactic forceps have been so widened that the rate of forceps ope-

ration in most institutions, particularly in the United States, Great Britain and other Western countries, has considerably gone up. This increase in the rate has occurred at the expense of spontaneous deliveries and not caesarean section. Paradoxically, the rate of caesarean section has also gone up from 5% to 15% (Jeffcoate).

The forceps are now used electively and selectively to aid the mother and the baby. It has truly become an "instrument of deliverance". Gone are the days when an obstetrician used his mighty force to deliver a child with forceps. It is now looked upon as an art and a test for his skill and judgement.

Recently, a doubt has been expressed in many quarters that the obstetric forceps ultimately will disappear and their place will be taken over by the vacuum extractor introduced by Malmström. This is best answered by facts and figures rather than by wishful thinking. From what has been said above, the rapid increase in the rate of forceps operation in recent years, albeit the simultaneous increase in the rate of caesarean section, unequivocally proves the usefulness of forceps in modern obstetrical practice. It will be apparent that the obstetric forceps, both in their structure and in their use as a method of delivery, have never remained static nor will they be. Improvements and modifications will continue to appear. One can confidently hope the day is not far off when we may have an "ideal forceps" to suit all conditions.

#### References

1. Caldwell, W. E., D'Esopo, D. A. and Moloy, H. C.: Nelson Loose-Leaf Living Surgery, New York, 1928, Vol. VII: Chapter xlii, Thomas, Nelson & Sons, p. 809.
2. Chassar-Moir, J.: Munro Kerr's Operative Obstetrics, 1964, Bailliere, Tindall & Cox.
3. Cianfrani, Theodore: A Short History of Obstetrics & Gynaecology, Charles C. Thomas, Illinois, U.S.A. 1960, Springfield.
4. Codecido, E. F.: Rev. Obst. Y. Ginec. Venezuela. 18: 337, 1958.
5. Das, Kedarnath: Obstetric Forceps, Its History and Evolution, Calcutta, 1929, Art Press.
6. Das, Kedarnath: Indian Med. Gaz. 66: Dec. 1931.
7. DeLee, J. B. and Greenhill, J. P.: Principles and Practice of Obstetrics, Philadelphia and London, 1947, W. B. Saunders.
8. Dennen, E. H.: Forceps Delivery, Philadelphia, 1955, F. A. Davis Co.
9. Dill, L. V.: The Obstetrical Forceps Springfield, U.S.A. 1953, Charles C. Thomas.
10. Greenhill, J. P.: Year Book of Obstetrics & Gynaecology, Publishers, 1958-59, The Year Book Chicago, p. 207.
11. Jeffcoate, T. N. A.: Brit. Med. J. 2: 951, 1953.
12. Jeffcoate, T. N. A.: Modern Trends in Obstetrics & Gynaecology, 2nd series. By Kenneth Bowes, London, 1955, Butterworth & Co. Ltd.
13. Johnstone, R. W.: William Smellie Edin & London, 1952, E. & S. Livingstone Ltd.
14. Kishore, Nawal: J. Obst. & Gynec. India. 18: 531, 1968.
15. Laufe, Leonard: Obst. & Gynec. 7: 91, 1956.
16. Laufe, Leonard: Obst. & Gynec. 14: 541, 1959.

17. Leff, Morris: Am. J. Obst. & Gynec. 70: 208, 1955.
18. Mann, John: J. Obst. & Gynec. Brit. Emp. 64: 351, 1957.
19. Miseo: Obst. & Gynec. 8: 487, 1956.
20. Moolgaokar: Personal Communication.
21. Munro-Kerr, J. M. Johnstone, R. W. and Miles, Philips: Historical Review of British Obst. & Gynec. 1800 to 1950, Edin. & Lond., 1954, E. & S. Livingstone Ltd.
22. Rhodes, Philip: J. Obst. & Gynec. Brit. Emp. 65: 353, 1958.
23. Rhodes, Philip: J. Obst. & Gynec. Brit. Comm. 75: 793, 1968.
24. Robinson, A. L.: J. Obst. & Gynec. Brit. Emp. 41: 509, 1934.
25. Shute, W. B.: Am. J. Obst. & Gynec. 77: 442, 1959.
26. Smith, E. Conwary: Am. J. Obst. & Gynec. 94: 931, 1966.
27. Speert, Harold: Obst. & Gynec. Milestones, New York, 1958, The Macmillan Co.
28. Spencer, Herbert: The History of British Midwifery from 1650 to 1800, London, 1927, John Bale, Sons and Danielson.
29. Thierry, E.: La Presse Medicale, No. 81, p. 1423, Paris 1950.
30. Tulene, M. A.: Rev. Obst. Y Gin. Venezuela. 22: 665, 1962.
31. Williams, W.: Obstetrics, New York and London, 1931, D. Appleton Centenary Co.

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*See Figs. on Art Paper I to III*