

Forceps versus vacuum extractor in obstetric practice

by

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The title of this article suggests a conflict of interests between two rival instruments contending for the obstetrician's favour. If this is true it is unfortunate because it should not be so, for whether one or the other instrument is employed matters little, as long as mother and child come through the operation safely. After all, the interests of these passive participants in the obstetrical game are those that really matter. That being the case, the title might be more appropriately reworded:—

“The Obstetrician Versus The Unfavourable Results of Forceps Delivery And Vacuum Extration”

As mentioned in the opening lines, there has indeed been a clash of interests. In 1957, after a dormancy of 251 years, the “air-tractor” first described by Yonge in 1706, reappeared

in modern garb, modelled and tailored according to the specifications of Malmstrom of Sweden. Within a short time his new “vacuum extractor” gained widespread acceptance in Continental Europe, Russia, Africa, South America and even the Orient—China and Japan. Such was its popularity that in certain European centres it has superseded the time-honoured obstetric forceps in practice. (Malmstrom of Sweden, 1957; Snoeck of Belgium, 1960; Lange of Denmark, 1961). The foetal results reported are consistently better than those of forceps delivery, (Table I) without increasing the Caesarean section rate (Table II).

In conservative Britain even as recently as 1954 the historic air tractor was termed a “freak device” by none other than Munro Kerr and the mere thought of using it to assist delivery was likened to “urchins in the streets

TABLE I
FOETAL RESULTS

| Series | No. of Cases | | Perinatal Mortality | |
|--|--------------|---------|---------------------|---------|
| | V. Extr. | Forceps | V. Extr. | Forceps |
| Berggren (1959) | 100 | 80 | 5.0 % | 12.5% |
| Bergman & Malmstrom (1961) | 596 | 793 | 1.5 % | 4.1 % |
| Lange (1961) | 480 | 376 | 3.8 % | 6.6 % |
| Present series (K.K. Hospital) 1961 | 193 | 123 | 1.08% | 3.2% |

TABLE II
VACUUM EXTRACTOR RESULTS
(Malmstrom, Sweden 1957-61)

| | 1957 | 1958 | 1959 | 1960 | 1961 |
|---------------------|---------------|--------------|---------------|---------------|---------------|
| Deliveries | 2357 | 2236 | 2173 | 2085 | 2056 |
| Deliveries | 4 | 0 | 0 | 0 | 0 |
| Vacuum extractor | 131 (5.5%) | 77 (3.4%) | 110 (5.0%) | 106 (5.0%) | 121 (5.8%) |
| Caesarean sections | 38 (1.6%) | 28 (1.2%) | 39 (1.8%) | 23 (1.1%) | 31 (1.4%) |
| Perinatal mortality | 3.0% | 2.5% | 4.5% | 1.9% | 1.6% |

of Edinburgh playing marbles, spinning tops or fighting”—such irresponsible childish activities. British conservatism however is not to be mistaken for inflexibility and resistance to progress. Professor Essen Moller of the University of Lund has this to say:—

“The common sense and critical power of British obstetricians create a strong conservatism and sound judgement of new proposals. At the same time they have an open mind for new ideas of real value and always give them a fair trial”.

It was in this spirit and with an open mind that Chalmers and Fothergill (1960) gave the new instrument a fair trial with the result that the vacuum extractor gained a foothold on British soil.

Largely through their outstanding leadership in demonstrating the safety of the instrument on mothers and babies, the vacuum extractor is now established as a worth adjunct to forceps in the British Isles. The latest editions of “Progress in Obstetrics and Gynaecology” (Lewis, 1964) and “Recent Advances” (Bourne and Williams, 1962) each contains a chapter devoted to it, thus acknowledging the vacuum extractor to be both an “advance” and “progress”.

In the United States of America, that land renowned for the unthinkable and the incredible, the vacuum extractor met both. Fresh from its recent cross-channel victory, it braved the Atlantic, only to find the door slammed in its face by the Food and Drugs Administration of the U.S.A. An import ban was placed on the instrument. The implementation of such a drastic measure rightfully belongs to the realm of the unthinkable and incredible.

In order to fully appreciate the impact of the displacement of obstetric forceps by the vacuum extractor, it is necessary to briefly trace the development of the forceps. The brain-child of the Chamberlen family in the 17th century, the instrument underwent modification and improvement over the years, so that today over 800 different models are said to exist. Many models have appeared for the sole apparent purpose of improving the name of some practitioner of obstetrics rather than for the purpose of improving the practice of obstetrics. A few names however have earned their place in history. Levret introduced the pelvic curve, Smellie invented the double-slot lock and added the shank to increase the mechanical advantage of the instrument, and Tarnier added the axis-tractor. Of course we must not omit Kjelland whose long straight forceps

have proved as controversial as the vacuum extractor.

For an instrument honoured by names such as those mentioned, and developed to a fine pitch of mechanical perfection, to be cast aside in reputable teaching centres in favour of a newcomer is something not to be lightly dismissed as "wild enthusiasm" or "passing fancy". Indeed its adoption by the circumspective and conservative British is ample testimony of its worth. The main virtue of the vacuum extractor lies in the claim by its users of greater safety to mother and child than usually obtained with the obstetric forceps. Whether these claims are true, we shall now examine.

Firstly, let us consider their modes of action which are so radically different. The long mental forceps blades, are introduced into the maternal birth canal, sometimes for a considerable distance, to enclose the foetal head within its two limbs, and by traction exerted on the facial bones, effect a safe exit for the child. The introduction, positioning, locking and traction are potentially dangerous manoeuvres whose accuracy and safety depend on the manual dexterity and fine judgement of the operator.

Vacuum extraction on the other hand consists of the application of a metal cup to the most dependent and accessible part of the foetal head, the creation of a suction force and traction on the resultant caput to effect delivery. Only fine judgement and little manual dexterity is required in order that damage to the vulnerable cranial contents may be avoided.

TABLE III

**Foetal Outcome of Vacuum Extraction
(Wong, 1961)**

| | |
|------------------|--|
| Scalp | Abrasions. Necrosis. Caput formation. Air crepitus. |
| Skull | Cephalhaematoma. Erosion. Buckle fractures. |
| Brain | Neurological signs, stiffness. Meningeal tears. Haemorrhage. |
| Mortality | 1.25% |

In the literature safety to mother and child is claimed as the virtue for both forceps and extractor. The exponent of each instrument views with horror the atrocities committed by the other. Both sides boast able and reputable men in their ranks. Surely both sides cannot be right and wrong at the same time. What are the facts? Let us examine the damage each instrument is liable to inflict. These are listed in Tables III, IV and V.

TABLE IV

**Forceps Complications—Foetal
(P. Jones, 1952)**

| | |
|------------------|----------------------------------|
| Face | — Abrasions. Bruises. Paralysis. |
| Fractures | — Skull. Mandible. Spine. |
| Cord | — Compression by Forceps blade. |
| Placenta | — Separation. |

TABLE V

**Forceps Complications—Maternal
(P. Jones, 1952)**

| | | |
|-----------------------------------|--|-------------------------|
| Bladder | } | — Haematuria. Fistulae. |
| Urethra | | |
| Genital Tract | — Tears of Perineum, Vagina, Cervix, L.U.S., Uterus, Rectum, Pouch of Douglas. | |
| Pelvis | — Dislocation Sacro-iliac Joint. Separation Symphysis Pubis. Fracture Coccyx. | |
| Nerves | — Sacral plexus injuries. | |
| Anaesthetic Complications. | | |

As far as the mother is concerned, there is no doubt whatever that the vacuum extractor is safer by far. This is merely because the nature of the vacuum cup is such that serious maternal injury is impossible. The only small risk is inclusion of some part of maternal soft tissues in the suction cup. The forceps blade on the other hand is liable to inflict injury to various maternal structures such as bladder, rectum, peritoneum, vagina, cervix and uterus.

In the case of the foetus each instrument is liable to cause certain injuries peculiar to itself by virtue of the different modes of action. Forceps exert a crushing force when mal-applied or mis-used. Vital structures on the face and within the cranium are thus exposed to trauma especially when undue force is used. The vacuum cup exerts a suction force on an area of the scalp and its underlying meninges and brain. Undue traction force leads to tearing and haemorrhage.

These frightful lists of maternal and foetal trauma are obviously preventable and their prevention should be our first pre-occupation rather than the championing of one instrument and condemnation of the other. Prevention is based on these general principles:—

1. Proper selection of cases. This is the first step, for unless the conditions for safe delivery are present, the effort is dangerous and doomed to failure, no matter what instrument is used.
2. Correct operative technique. Here the question of adequate supervision and expert guidance comes in. Every junior member of the obstetric team should be taught the fine points of forceps and vacuum extraction and how to avoid pitfalls.
3. Provision for an alternative method of delivery, *i.e.* Caesarean section, so that where undue mechanical difficulties are anticipated or encountered, an attempt at instrumental delivery need not be pursued to the bitter end. This principle is embodied in the operation of “trial forceps” and “trial vacuum extraction”. In short, difficult vaginal extractions are unprofitable and too hazardous, and should be given up in favour of the safer abdominal procedure.

If these three principles are observed in all cases of instrumental delivery, the unfavourable results mentioned may be altogether eliminated. The major faults of forceps delivery arise from attempts at delivery in unsuitable circumstances *e.g.* undilated cervix, unfavour-

able position of the head, severe disproportion, inexpert technique, use of undue force especially with axis-traction and Kjelland's forceps.

The main faults with vacuum extraction lie in the use of undue vacuum force (more than 0.7 kg. cm.) to overcome major disproportion or a tough vaginal outlet, repeated slipping of the cup, application of the cup to unsuitable and vulnerable sites *e.g.* anterior fontanelle or to one parietal bone alone, and prolonged application (over 20 minutes). (Tables 6 and 7).

The next question that arises is: “Which instrument should one use, and when?” This question can be easily answered. The instrument to use is the one which can be expertly and confidently employed for the particular situation. For the following indications either instrument may be employed with success:—

1. Delay in the second stage
2. Distress—maternal and foetal
3. Prophylactic assisted delivery

Forceps should be preferred, however, if more than moderate traction is required or where difficult rotation of the head is anticipated. For face presentation and the after-coming head, naturally, forceps only may be employed.

On the other hand, being a simpler procedure, the vacuum extractor has advantages over forceps in the “lift-out” of the head which is held up on the perineum. Secondly, for the novice who is forced to make a start without expert guidance, the vacuum extractor is probably safer than forceps. Thirdly, cases of delay in the late first stage due to uterine hypotonia can only be treated by the vacuum extractor. This last use of the extractor constitutes its major advantage over forceps.

In all this discussion, we must not forget the value of oxytocin infusion in the treatment of uterine inertia and generally for improving uterine function. Its timely use can avoid unnecessary forceps and vacuum extraction. Its use to augment uterine powers during forceps and vacuum extraction is of greatest value in reducing the extractive (and traumatic) force necessary.

TABLE VI

Major Pitfalls in Vacuum Extraction

1. Excessive vacuum (< 0.7 kg cm.²)
2. Disproportion (including rigid outlet)
3. Repeated slipping off cup
4. Vulnerable site—anterior fontanelle, unilateral parietal application
5. Prolonged application

TABLE VII

Foetal Morbidity Related To Duration Of Application

(70 consecutive cases with adequate data)

K.K. Hospital, 1961

| Duration in minutes | No. of cases | Morbidity | |
|---------------------|--------------|-----------|----------|
| | | Cases | Per cent |
| — 5 | 28 | 0 | 0 |
| 6—10 | 20 | 2 | 10 |
| 11—15 | 12 | 3 | 25 |
| 16—20 | 6 | 2 | 33 |
| 21—25 | 3 | 3 | 100 |

Also let us not forget Caesarean section as the method of delivery made safe by modern surgical and anaesthetic advances. Surely the days of "blood and thunder" obstetrics such as the dragging of foetal heads through narrow pelvis should belong only to the realm of history.

In conclusion, it may be said that there is no perfect or ideal obstetric instrument, nor will there ever be. Each instrument has its strong and weak points and it behoves the operator to be conversant with each. In the words of the great Smellie: "We ought never to trust too much or be over sanguine in respect of any particular method of practice, but vary the same as we feel it necessary". Operative obstetrics has progressively become less empirical and more selective. The operative procedure

is to be determined not so much by the diagnosis but rather by the circumstances. So much depends on a happy sense of proportions and judicious sizing up of the situation. It will not be far wrong, then, in summing up to say that neither are forceps better than vacuum extractor nor vacuum extractor better than forceps, but each can only be as good as its user. In expert hands both can be used with complete safety.

Summary

The merits and demerits of forceps and vacuum extractors have been presented. The major factor which determines the safety of instrumental delivery is the operator rather than instrument used. It is concluded that each instrument has a place in modern obstetric practice and in the hands of an experienced and careful operator, both instruments may be used with complete safety.

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