A properly conducted trial of a ventouse can prevent unexpected failure of instrumental delivery

E. T. M. DE JONGE, B. G. LINDEQUE

Summary

A retrospective study over a 5-year period reviewed 71 unexpected failures of instrumental delivery and compared them with a group of 21 trials of ventouse to identify causes for failure and their impact on neonatal outcome. There was a statistically significant difference between the two groups in terms of pre-application assessment of fetal size, maternal pelvis and palpable fetal head above the pelvic brim ($P < 0,00001$). There was also a significant difference in neonatal morbidity ($P < 0,01$). All 5 neonatal deaths occurred in the failure group and were associated with multiple instrumentation.

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It is generally agreed that difficult instrumental deliveries should be replaced by primary caesarean section. Unexpected failures of instrumental deliveries are associated with a high incidence of neonatal asphyxia and neurological sequelae.[1-3] Trial of instrumentation, as introduced by Douglass and Kaltreider[4] in 1953, is well established in the management of patients with delay in the second stage of labour, partly because it was shown that primary caesarean section in these cases did not totally eliminate immediate neonatal depression.[1,5] The outcome for the neonate after primary caesarean section for delay in the second stage of labour in fact corresponded to that after failed instrumental delivery.[1,6,7]

Lowe[1] found that a carefully conducted trial of instrumental delivery, performed in theatre, is a safe alternative to primary caesarean section. It is of utmost importance to re-assess every failed instrumental delivery retrospectively to identify preventable factors and causes of suboptimal management. In this study, cases of failed instrumental deliveries were compared with cases of trial of ventouse, in an attempt to identify causes for failure and to determine the impact on neonatal outcome.

Patients and methods

A retrospective study of patients' records over a 5-year period from January 1985 to December 1989 was carried out. The patients were treated in the academic hospitals of the University of Pretoria. The study considered two groups of patients: (*i*) patients in whom instrumental delivery failed; and (*ii*) patients undergoing trial of ventouse. Both groups were compared in terms of pre-application conditions, i.e. fetal size estimation, clinical pelvimetry and fifths of the fetal head palpable above the pelvic brim, and also in terms of fetal outcome.

Failed instrumentation was defined as application of either a forceps or a ventouse that did not result in delivery of the fetus. Trial of instrumentation is a situation where a forceps or a ventouse is applied, the first attempt being performed in a theatre fully equipped to proceed to caesarean section if there is no descent of the presenting part on the first controlled traction during uterine contraction.

We used the resuscitation score described by Healey *et al.*[8] as an indicator of neonatal outcome. This score includes three variables: (*i*) Apgar score of $\leqslant 7$ at 5 minutes; (*ii*) establishment of regular respiration after $\geqslant 4$ minutes; and (*iii*) need for endotracheal intubation. One point is allocated to each variable and a score of $\geqslant 1$ is considered indicative of significant birth hypoxia. For statistical analysis we used Fisher's exact test, the Mann-Whitney *U*-test and Pearson's χ^2 test where appropriate. Differences were considered significant at $P < 0,05$.

Results

During the study period a total of 37 113 patients were delivered, with an overall caesarean section rate of 14,6% and a rate of 11,1% for instrumental deliveries (4,0% ventouse, 7,1% forceps). The uncorrected perinatal mortality was 37,3/1 000 deliveries. We recorded 71 failures and 21 cases of trial of instrumentation. The indication for each of these assisted deliveries was prolonged second stage of labour (full dilatation for more than 1 hour). The failure and trial groups are compared in Table I.

Patients in the trial group were assessed more completely regarding pre-application conditions than patients in the failure group. In only 9,9% of failures were all three pre-application conditions evaluated, while 38,1% of trial patients were thus evaluated. This was a highly significant difference ($P < 0,00001$).

In two-thirds of cases of failure, more than 1 instrument was applied to try to deliver the fetus. In 38 cases 2 instruments were used and in 11 cases 3 instruments were applied. Table II summarises fetal outcome in terms of morbidity and mortality associated with multiple instrumentation. Although not statistically different, there is a strong tendency towards more severe fetal damage with multiple instrumentation. The same applies to fetal outcome measured by the resuscitation score ($P = 0,0534$).

Neonatal morbidity in the failure group included the need for intubation and ventilation (10 cases), cephalohaematoma (5), sub-aponeurotic bleeding with permanent neurological sequelae (1), transient cerebral oedema (2), the need for phototherapy (6), exchange transfusion (1), and the development of necrotising enterocolitis (1). There was 1 fetus in the trial group who needed short-term intubation. All 5 cases of neonatal death were found to be associated with multiple instrumentation.

Discussion

Unexpected failure of instrumental delivery is not rare. Lowe[1] reported a failure rate of 1 in every 51 assisted deliveries, which is in line with our failure rate of 1/58 assisted deliveries.

Department of Obstetrics and Gynaecology, University of Pretoria
E. T. M. DE JONGE, M.B. CH.B., M.MED. (O. & G.)
B. G. LINDEQUE, M.B. CH.B., M.MED. (O. & G.), F.C.O.G. (S.A.), M.D.

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TABLE I. COMPARISON BETWEEN FAILED INSTRUMENTATION AND TRIAL OF VENTOUSE

Parameters	Failure (N=71)	Trial (N=21)	P-value
Mean ± SD (yrs)	**22,9 ± 6,2**	**23,1 ± 6,7**	**>0,05***
Nullipara (%)	**48 (67)**	**12 (57)**	**>0,05†**
Pre-application evaluation			
Fetal weight (%)	**21 (29,6)**	**16 (76,2)**	**<0,001†**
Clinical pelvimetry (%)	**58 (81,7)**	**19 (90,5)**	**>0,05†**
Fetal head above symphysis (%)	**15 (21,1)**	**12 (57,1)**	**<0,01†**
All 3 factors (%)	**7 (9,9)**	**8 (38,1)**	**<0,00001**
Multiple instrumentation (%)	**49 (68,0)**		
2 instruments (%)	**38 (53)**		
3 instruments (%)	**11 (15)**		
Resuscitation score 1 (%)	**22 (31,0)**	**2 (9,5)**	**>0,05‡**
Neonatal morbidity (%)	**30 (42,0)**	**1 (4,8)**	**<0,01‡**
Neonatal mortality (%)	**5 (7,0)**		**>0,05‡**

* Mann-Whitney U-test
† Fisher's exact test.

TABLE II. MULTIPLE INSTRUMENTAL FAILURES AND NEONATAL OUTCOME

	Neonatal outcome		
	Normal	Morbidity	Mortality
1 failure	**13**	**9**	**0**
2 failures	**16**	**19**	**3**
3 failures	**7**	**2**	**2**

Pearson's χ^2 test $P > 0,05$.

If the failure group is compared with the trial group, it is striking that all neonatal morbidity and mortality was associated with unexpected failure. This might have been prevented by careful evaluation of the pre-application conditions, changing a situation of prolonged uncontrolled traction to a trial situation where the attending obstetrician was aware of a possible failure and did not commit himself to a vaginal delivery. The indication for trial of instrumentation is the presence of relative fetopelvic disproportion with less than two-fifths of the fetal head above the pelvic brim in the absence of fetal distress. Trial of instrumentation should be bypassed in cases of absolute fetopelvic disproportion with or without fetal distress and/or more than two-fifths of the fetal head above the pelvic brim. This is an indication for primary caesarean section.[9]

We advocate the use of a ventouse as primary instrumentation for trial because of its easier application under less favourable pre-application conditions with less maternal trauma.[10,11] The fact that 8 out of 21 trials of ventouse failed in this study, which is much higher than in previous series (Lowe[1] 1:26; Cardozo *et al.*[5] 1:17), demands some consideration. Firstly, this high failure rate of trial of ventouse might be an indication of true disproportion in our study versus a higher incidence of dysfunctional labour in the other studies[1,5] as the reason for delay in the second stage of labour and trial of instrumentation. Secondly, it is possible that the two-fifths of the fetal head above the pelvic brim, although anatomically the real landmark of engagement, is not selective enough in our patient population with its high incidence of disproportion to succeed with a trial of ventouse. Recently, new departmental policy demands no more than one-fifth of the fetal head above the pelvic brim as selection criterion for trial of ventouse.

The 66% multiple instrumentation in cases of failure can be ascribed to pressure of circumstances and poor judgement because of relative inexperience by the attending doctor. Multiple instrumentation should be avoided at all times in order to prevent maternal trauma and poor neonatal outcome.

With the exception of a technical failure, we condemn the use of a forceps after a technically correct, but failed ventouse. This is in agreement with the statements of Broekhuizen *et al.*[10] and Greis *et al.*[12]

In conclusion, we have defined criteria to select patients for trial of ventouse and to avoid unexpected failure. Proper pre-application assessment will identify those patients suitable for trial of ventouse and will prevent fetal damage associated with multiple instrumentation. The clinician should apply these criteria before attempting any instrumental delivery.

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