—Report on Experiments and Clinical Cases—

Perinatal Outcomes of Failed Vacuum Extraction

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Abstract

The aims of this study were to compare the perinatal outcomes of successful vacuum extraction (VE) or failed VE and to compare the perinatal outcomes of failed VE followed by forceps delivery (FD) or Cesarean section (CS) from 2000 through 2007. Compared with cases of successful VE, cases of failed VE followed by CS had a significantly higher incidence of neonatal complications, whereas cases of failed VE followed by FD had a significantly higher incidence of maternal injury. Both CS and FD remain important yet distinct treatments for emergency cases of failed VE. Therefore, the decision to use a second instrument (FD) or to proceed to CS should be made in each case on the basis of these differences.
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Key words: failed vacuum extraction, cesarean section, forceps delivery, perinatal outcome

Introduction

Vacuum extraction (VE) or forceps delivery (FD) are used to facilitate childbirth in the second stage of labor to avoid Cesarean delivery and its associated morbidities[1–9]. In addition, trends in operative vaginal delivery have shown increasing numbers of VE and decreasing numbers of FDs worldwide owing to concerns over neonatal and maternal safety[7]. Although VE is successful in the most cases, failure of VE is not uncommon[1–9]. In cases of failed VE either FD is attempted or cesarean section (CS) is performed as soon as possible; however, cases of failed VE followed by FD or CS or both are reportedly associated with higher rates of adverse perinatal outcome than are cases of successful VE[2,4].

The aims of the present study were to compare perinatal outcomes of successful VE or failed VE and to compare perinatal outcomes of failed VE followed by FD or CS at our hospital.

Patients and Methods

Figure 1 shows the outcomes of VE in cases of singleton pregnancy with a neonatal birth weight ≥2,500 g beyond 37 weeks' gestation at our hospital from 2000 through 2007. In our hospital, VE is considered the method of choice in cases of prolonged second stage of labor with or without malrotation or nonreassuring fetal status or both. In most cases, metal-cup VE (5–6 cm in diameter) is used.

During the 8-year study period, VE was tried in 890 cases (**Fig. 1**): VE was successful in 846 cases (95.1%) but failed in 44 cases (4.9%). When VE failed, CS was performed without a trial of FD in 20 cases, and FD was tried in 24 cases; however, in 1 of these 24 cases, CS was required because FD also failed.

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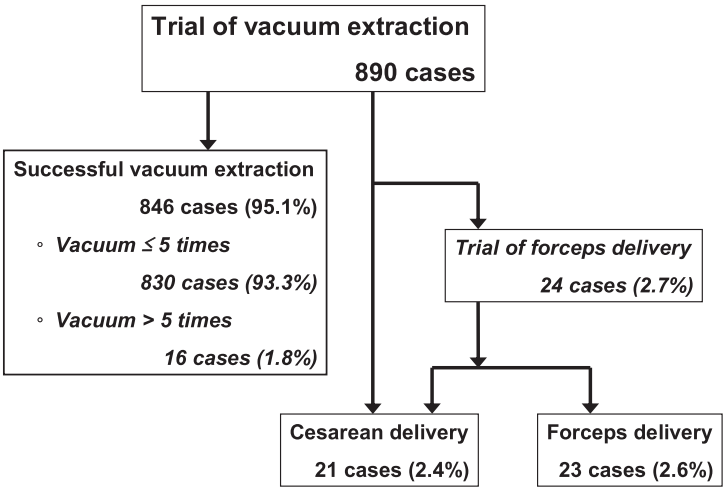

Fig. 1 Outcome of vacuum extraction in cases of singleton pregnancy with neonatal birth weight ≥2,500 g beyond 37 weeks' gestation from 2000 through 2007

Table 1 Perinatal outcomes of patients with successful VE or failed VE followed by CS and FD

	Successful VE	Failed VE Failed VE → CS	Failed VE → FD
N	846	21	23
Indication for VE			
Non reassuring fetal status	211 (24.9%)	7 (33.3%)	7 (30.4%)
Malrotation	71 (8.4%)	5 (23.8%)*	2 (8.7%)
Neonatal birth weight			
≥3,500 g	117 (13.8%)	2 (9.5%)	4 (17.4%)
Apgar score at 1 minute			
<4	12 (1.4%)	3 (14.3%)*	1 (4.3%)
<7	68 (8.0%)	4 (19.0%)	5 (21.7%)
Apgar score at 5 minutes			
<4	3 (0.4%)	1 (4.8%)	1 (4.3%)
<7	20 (2.3%)	3 (14.3%)	1 (4.3%)
Umbilical artery pH			
<7.1	37 (4.4%)	3 (14.3%)*	1 (4.3%)
Neonatal complications			
Subperiosteal hematoma	0	0	0
Subgaleal hemorrhage	1 (0.1%)	1 (4.8%)*	0
Perineal laceration			
Grade 3	39 (4.6%)	0	0
Grade 4	14 (1.7%)	0	4 (17.4%)*
Maternal blood loss			
≥1,500 g	8 (0.9%)	0	3 (13.0%)*
Requiring hemotransfusion	1 (0.1%)	0	1 (4.3%)*

VE, vacuum extraction, CS, Cesarean section, FD, forceps delivery
*P<0.05

Maternal demographic data; labor and delivery details, such as perineal laceration and postpartum hemorrhage; and neonatal data, such as birth weight, Apgar score, umbilical artery pH, and cranial injury, were obtained from the medical records.

We also examined perinatal outcomes in cases of successful VE with VE tried ≤5 times or >5 times. The guidelines for obstetric practice in Japan of

Table 2 Perinatal outcomes of patients with successful VE with VE tried ≤5 times or >5 times

	VE ≤5 times	VE >5 times
N	830	16
Indication for VE		
Non reassuring fetal status	208 (25.1%)	3 (18.8%)
Malrotation	63 (17.6%)	8 (50.0%)*
Neonatal birth weight		
≥3,500 g	114 (13.7%)	3 (18.8%)
Apgar score at 1 minute		
<4	11 (1.3%)	1 (6.3%)
<7	64 (7.7%)	4 (25.0%)
Apgar score at 5 minutes		
<4	3 (0.4%)	0
<7	19 (2.3%)	1 (6.3%)
Umbilical artery pH<7.1	36 (4.3%)	1 (6.3%)
Neonatal complications		
Subperiosteal hematoma	0	0
Subgaleal hemorrhage	1 (0.1%)	0
Perineal laceration		
Grade 3	39 (4.6%)	0
Grade 4	14 (1.7%)	1 (6.3%)
Maternal blood loss		
≥1,500 g	8 (0.9%)	0
Requiring hemotransfusion	1 (0.1%)	0

VE, vacuum extraction
*P< 0.05

2008 and 2011[10] have made the following recommendations with the level of C, which are possible options that may favorably affect the outcome but for which some uncertainty remains regarding whether the possible benefits outweigh the possible risks: (1) do not use VE for more than 20 minutes, and consider FD or an emergency CS if necessary (20-minute VE trial rule), and (2) do not try VE more than 5 times, even if VE has been used for less than 20 minutes (5-time VE trial rule). In 16 cases (1.9%) of successful VE during the study period, VE was tried more than 5 times, because the guidelines for obstetric practice in Japan[10] had not yet been published.

Statistical differences between subjects and controls were evaluated with the c^2 test with Yates' correction. Differences with p values < 0.05 were considered significant.

Results and Discussion

Table 1 shows perinatal outcomes in cases of successful VE and cases of failed VE followed by CS and FD. Compared with cases of successful VE, cases of failed VE followed by CS had significantly higher incidences of low Apgar score and neonatal subgaleal hemorrhage, whereas cases of failed VE followed by FD had significantly higher incidences of grade 4 perineal laceration and maternal postpartum hemorrhage requiring transfusion.

Table 2 shows perinatal outcomes in cases of successful VE in which VE was tried ≤5 times and >5 times. When VE was successful, the rate of malrotation was significantly higher in cases in which VE was >5 times than in cases in which VE was tried ≤5 times. However, we found no differences in perinatal outcomes between cases of successful VE in which VE was tried ≤5 times and >5 times.

We found that the rate of adverse neonatal outcomes in cases of VE failure followed by FD or CS or both was higher than that in cases of successful VE, a finding that is contrary to a recent report by Wanyonyi et al.[6] The reason for this

difference is not clear because our VE procedures do not seem to differ from those followed by Wanyonyi et al.[11]; however, the number of cases of failed VE was small in both studies. In 2003, however, Sadan et al.[2] reported that in cases of failed VE, both FD and CS increase the neonatal risk of low Apgar score and recommended that the choice of method should depend on the individual circumstances according to the judgment of the attending obstetrician[8]. Therefore, further examinations may be needed after 2008 when the Guidelines for obstetrical practice in Japan[10] were published, although in the present study there were no differences in perinatal outcomes after successful VE between cases in which VE was tried ≤5 VE times and >5 times (**Table 2**).

The present results suggest that nonreassuring fetal status may progress in cases of CS following failed VE. The progression of NRFS may be due to time for preparations or anesthesia for CS. In our hospital 10 to 20 minutes are needed to prepare for emergency CS, and spinal anesthesia is usually performed for emergency CS. Spinal anesthesia sometimes causes spinal hypotension associated with fetal acidemia[12]. In addition, failed instrumental delivery, either FD or VE or both, in a setting where a CS can follow promptly has not been reported to be associated with increased morbidity of either the mother or neonate[6,8,9]. Therefore, the current results may reflect a serious problem in our institution.

Although our present results show that FD may be associated with a better composite neonatal outcome than is CS following failed VE, the risks of maternal injury seemed to be increased in cases of FD. These results may consistent with previous findings[4] and may be related to the passage of forceps, because the passage diameter of fetal head with forceps is larger than that with vacuum.

Therefore, CS and FD remain as important yet distinct treatments for emergency cases of failed VE. The decision to use a second instrument (FD) or to proceed to CS should be made in each case on the basis of the differences between FD and CS suggested by the present results. In addition, we may have to consider that the sequential use of instruments at operative vaginal delivery is an alternative to CS in certain circumstances[9].

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