OBSTETRICS

Effect of maternal intravenous fluid therapy on external cephalic version at term: a prospective cohort study

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OBJECTIVE: We sought to analyze whether maternal intravenous fluid therapy prior to external cephalic version (ECV) increases the amount of amniotic fluid and the success rate of the procedure.

STUDY DESIGN: This was a prospective single-center cohort study of 200 women with a consecutive cohort of 100 pregnant women with a breech presentation at term who were administered intravenous fluid therapy with 2 L of hypotonic saline before the version attempt, compared to a control cohort of 100 pregnant women not given hydration treatment.

RESULTS: The mean increase in the amniotic fluid index (AFI) after intravenous maternal hydration was 3.75 ± 2.71 cm. The amount of fluid before hydration was the only variable found to be associated with increases in amniotic fluid levels, both in absolute and relative terms (odds ratio, −0.21; 95% confidence interval, −0.37 to −0.05 and odds ratio, −4.62; 95% confidence interval, −6.17 to −3.06; $P < .01$, respectively). We did not observe any severe complications secondary to the intravenous fluid therapy. The ECV success rate was 43% in the study group compared to 47% in the control group ($P = .67$). The success rate was significantly lower the larger the relative increase in the AFI, although no correlation was found in absolute terms (χ^2 for linear trend = 0.03 and 0.34, respectively).

CONCLUSION: Maternal intravenous fluid therapy with 2 L of hypotonic saline prior to ECV is an effective and safe technique for increasing the AFI. However, its use in ECV does not increase the success rate of the procedure.

Key words: amniotic fluid, breech presentation, external cephalic version, maternal hydration

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The aim of the external cephalic version (ECV) is to change the fetus to a head-first presentation. Various authors have identified factors associated with the likelihood of success of the procedure.[1-3] Among these, the amount of amniotic fluid is a factor that has been found to be associated with success: the greater amount of fluid, the higher the chance of success.[4-6]

One of the reasons for identifying factors associated with success is to be able to modify them to increase success rates. Some authors have attempted to increase the amount of amniotic fluid by transabdominal amnioinfusion in ECV.[7,8] Taking into account that there is limited evidence on amnioinfusion and that this approach is not risk-free,[9] it has been suggested that research continue into the effect on ECV of other noninvasive ways of increasing the amount of amniotic fluid, such as maternal intravenous fluid therapy.[10]

The objective of this study was to analyze whether maternal intravenous fluid therapy prior to ECV increases the amount of amniotic fluid and, in turn, facilitates rotation of the fetus during the procedure, thereby increasing the success rate.

Materials and Methods

This was a prospective cohort study, carried out in the Department of Obstetrics and Gynecology at Cruces University Hospital (Biscay, Spain) from March through November 2011. We compared a consecutive cohort of 100 pregnant women with breech presentation at term administered fluid therapy before the version attempt, with a historic control cohort of 100 consecutive patients who underwent ECV without intravenous fluid therapy. The study was approved by the Clinical Research Ethics Committee of Cruces University Hospital (reference ethics committee number, *CEIC 10-37*). Our center's exclusion criteria for ECV include: placenta previa, placental abruption, severe oligohydramnios, compromised fetal well-being, fetal death, severe malformations, multiple pregnancy, Rhesus incompatibility, uterine abnormalities, and clotting disorders.

Before the ECV procedure, we recorded the maternal vital signs and performed an ultrasound scan to determine the position of the fetus, the type of breech presentation, placental location, and the amniotic fluid index (AFI)

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as well as estimate the fetal weight. We also performed external fetal heart rate monitoring for 30 minutes. ECVs were carried out under fasting conditions after women had emptied their bladder in a delivery room adjacent to the operating room. All ECV were performed under tocolysis. The tocolytic drug of choice was ritodrine (continuous infusion at a dose of 200 μg/min for 30 minutes). In the event of contraindications to this drug, we used atosiban (a single dose of 6.75 mg as an intravenous bolus) 2 minute before starting the ECV. Two expert obstetricians trained in the technique performed ECV with aqueous gel under ultrasound assessment and with the patient in a slight Trendelenburg position. The procedure was considered to be successful when the breech was converted to a cephalic presentation. The maximum number of attempts to get the fetal version was 4.

In the study cohort receiving intravenous fluid therapy prior to the ECV, on admission, we checked that they had no contraindications to maternal fluid overload (hypertensive disorders in pregnancy, maternal heart or renal disease, or having received a transplant). After providing information regarding the study and obtaining the women's informed consent, we measured plasma osmolality and ion concentrations. Fluid therapy was provided while the patient was seated, intravenously with an 18-20G catheter at a rate of 1000 mL/h, delivering a total of 2 L of hypotonic saline. The version was attempted between 30 minutes and 3 hours after hydration. Prior to the procedure, we measured the AFI (posthydration AFI) and again analyzed plasma osmolality and ion concentrations. Hyponatremia was defined as sodium levels <135 mEq/L (mild hyponatremia = 125-135 mEq/L), hypokalemia as potassium levels <3.5 mEq/L (mild hypokalemia = 3-3.5 mEq/L), and hypochloremia as chloride levels <95 mEq/L (mild hypochloremia = 90-95 mEq/L). As plasma osmolality (total osmoles of solutes/kg of water) is directly correlated to sodium levels, when there is hyponatremia, there is also a reduced osmolality (<285 mOsm/kg).

TABLE 1
Characteristics of study populations (hydration) and control groups

Characteristic	Hydration (n = 100)	Control (n = 100)	*P* value
Maternal age, y	32.77 ± 4.08	34.09 ± 4.41	.02
Maternal weight, kg	74.14 ± 12.49	74.91 ± 12.03	.65
Maternal height, cm	162.28 ± 6.32	163.29 ± 6.30	.26
BMI, kg/m^2	28.17 ± 4.58	28.08 ± 4.15	.88
Parity			.21
Primiparous	75	67	
Multiparous	25	33	
Week of gestation at ECV			.34
37	89	83	
38	10	11	
39	1	3	
40	0	1	
41	0	1	
Placental location			.51
Anterior	41	37	
Posterior	52	54	
Others	7	9	
Type of breech			.26
Frank or incomplete	81	72	
Complete	9	16	
Double footling	10	12	
Amount of amniotic fluid			.14
Normal	95	89	
Reduced	1	6	
Increased	4	5	
Amniotic fluid index on admission	12.38 ± 3.60	12.47 ± 3.85	.86

BMI, body mass index; *ECV*, external cephalic version.

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After the ECV, the patients from both cohorts followed their routine obstetric check-ups. Participants were monitored until childbirth, when the following variables were recorded: fetal presentation at birth, type of delivery, and perinatal test results (Apgar test, fetal acid-base balance, rate of admission to the neonatal unit, and neonatal mortality).

In our center, the current rate of success of ECV is around 50%.[11] We estimated that the sample size required to detect a 20% difference in the success rate of the ECV procedure (with a power of 80% and an alpha error of 5%) was 100 patients in each cohort. Data collected was entered in databases created for this purpose. We analyzed the effect of maternal fluid therapy on the success rate of ECV by multivariate logistic regression adjusting for variables that are known to influence the success rate (which we have previously described in our population[6]). For the statistical