

Temporal and Regional Variations in Operative Vaginal Delivery in Canada by Pelvic Station, 2004-2012

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Abstract

Objective: To describe temporal and regional variations in Canada in the use of operative vaginal delivery (OVD) at term for singleton pregnancies by pelvic station between 2004 and 2013.

Methods: Rates of OVD among term singleton pregnancies in Canada (excluding Quebec) were estimated using information from the Discharge Abstract Database of the Canadian Institute for Health Information for the years 2004-2012 (n = 2 284 109). Deliveries were stratified by pelvic station. Temporal trends were assessed using the Cochran-Armitage test for linear trend in proportions by year. Geographic variation was assessed by calculating the rate and 95% confidence interval of each mode of delivery from 2010-2012 for each province and territory.

Results: Among singleton pregnancies at term, the OVD rate decreased from 12.0% in 2004 to 10.7% in 2012 ($P < 0.001$), whereas Caesarean section rates (excluding those following failed OVDs) increased from 24.9% to 26.7%. Forceps deliveries decreased from 3.1% to 2.5%, primarily due to decreases in midpelvic forceps delivery. Vacuum-assisted delivery increased significantly at outlet and low stations (by 26.0% and 15.1%, respectively) and remained stable at midpelvic station. The failed OVD rate was 0.3% and decreased by 23.7% ($P < 0.001$). There were large variations in OVD rates by province.

Conclusion: Temporal trends in OVD rates varied by pelvic station, with rates of outlet and low OVD increasing and rates of midpelvic and failed OVD decreasing. Vacuum extraction is increasingly replacing forceps deliveries at outlet and low stations, whereas Caesarean sections are replacing forceps deliveries at midpelvic stations. Variations in OVD rates across provinces suggest

differences in instrument preference and/or an evolution in standards of practice.

Résumé

Objectif : Décrire les variations temporelles et régionales caractérisant l'accouchement vaginal opératoire (AVO) à terme en station pelvienne dans les cas de grossesse monofœtale au Canada, de 2004 à 2013.

Méthodes : Nous avons estimé les taux d'AVO parmi les grossesses monofœtales menées à terme au Canada (à l'exclusion du Québec), en utilisant les renseignements fournis par la base de données sur les congés des patients de l'Institut canadien d'information sur la santé pour la période de 2004 à 2012 (n = 2 284 109). Nous avons stratifié les accouchements d'après la position pelvienne. Nous avons également évalué les tendances temporelles à l'aide du test de Cochran-Armitage, afin de déterminer si les proportions variaient linéairement selon l'année. Nous avons enfin déterminé la variation géographique en calculant le taux et l'IC à 95 % de tous les modes d'accouchement réalisés dans chaque province et territoire, de 2010 à 2012.

Résultats : Parmi les grossesses monofœtales menées à terme, le taux d'AVO a diminué pour passer de 12,0 %, en 2004, à 10,7 % en 2012 ($P < 0,001$), tandis que le taux de césariennes a augmenté (sauf celles réalisées après l'échec d'une tentative d'AVO), pour passer de 24,9 % à 26,7 %. La proportion d'accouchements par forceps est passée de 3,1 % à 2,5 %. Ce recul est principalement attribuable à une baisse du nombre d'accouchements par forceps en station mi-pelvienne. Le nombre d'accouchements assistés par ventouse a augmenté significativement en position vulvaire et par voie basse (de 26,0 % et de 15,1 %, respectivement) et est demeuré stable en station mi-pelvienne. Le taux d'échecs de tentatives d'AVO, qui s'est établi à 0,3%, a régressé de 23,7 % ($P < 0,001$). Les taux d'AVO varient largement selon la province.

Conclusion : Les tendances temporelles qui caractérisent les taux d'AVO varient selon la position pelvienne. Ainsi, les taux d'AVO en position vulvaire et par voie basse ont augmenté, alors que les taux d'AVO en station mi-pelvienne et d'échecs de tentatives d'AVO ont diminué. De plus en plus, l'extraction par ventouse remplace les forceps dans les cas d'accouchement assisté en position vulvaire ou par voie basse. Toutefois, la césarienne est en voie de

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remplacer l'accouchement assisté par forceps en station mipelvienne. La variation des taux d'AVO selon les provinces laisse supposer des différences quant à la préférence pour les instruments et (ou) une évolution des normes de pratique.

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INTRODUCTION

In contrast to the increasing Caesarean section (CS) rate, the operative vaginal delivery rate has declined over the last 25 years and varies markedly worldwide.^{1–5} In the United States, the OVD rate in 2013 was 3.3% of all deliveries compared with 9.4% of all deliveries in 1995.¹ In Canada, overall rates of OVD are substantially higher but have followed the same downward trajectory, from 17.4% of all vaginal deliveries in 1991 to 13.2% in 2014.^{3,4} These trends are concerning because OVDs can potentially prevent CS. In fact, a recent consensus statement endorsed by the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine advocated an increase in the use of OVDs as a strategy to safely lower the primary CS rate.⁶

OVDs include both forceps- and vacuum-assisted deliveries carried out at different pelvic stations (i.e., after the fetal head has descended to a different extent). Pelvic station-specific OVD rates are important to distinguish because midpelvic, low, and outlet OVDs are associated with significantly different rates of neonatal and maternal trauma.^{7,8} However, such rates are never reported in population-based studies, thus making reported temporal and regional variation in overall OVD rates less meaningful. Another critical factor responsible for maternal and fetal safety relates to the sequential use of forceps, vacuum, and CS, with combined and sequential use of these interventions associated with the highest rates of neonatal mortality and morbidity.^{8,9}

ABBREVIATIONS

CCI	Canadian Classification of Interventions
CI	Confidence interval
CIHR	Canadian Institutes of Health Research
CS	Caesarean section
ICD	International Classification of Diseases
NOS	not otherwise specified
OVD	operative vaginal delivery

We therefore carried out a study to describe temporal and regional variation in the use of OVD by pelvic station in term singleton pregnancies in Canada between April 2004 and March 2013.

METHODS

We carried out this study of hospital deliveries in Canada between April 2004 and March 2013 using data obtained from the Canadian Institute for Health Information's Discharge Abstract Database. This database contains information on all hospital deliveries in Canada, excluding Quebec. Trained health records personnel abstracted information into the database using standardized definitions, and data consistency and accuracy were ensured through routine quality assurance checks. Maternal, fetal, and neonatal information in the database included details of medical history, maternal characteristics, labour and delivery, neonatal condition, and details of diagnoses and interventions or procedures. Diagnoses in the database were coded using the Canadian version of the International Classification of Diseases (ICD-10-CA) throughout the study period, and interventions and procedures were coded using the Canadian Classification of Interventions (CCI). The accuracy of the perinatal information in the database has been demonstrated in validation studies.¹⁰

We included in the study all hospital deliveries at term (between 37 and 41 weeks' gestation) in Canada, excluding Quebec, that resulted in a singleton live birth (Z37.0) or a singleton stillbirth (Z37.1) between April 1, 2004, and March 31, 2013 (hereafter referred to as fiscal years 2004–2012). Missing gestational age data precluded the inclusion of deliveries in Prince Edward Island in 2004 and 2005 and deliveries in the territories in 2004.

Forceps deliveries were identified using CCI code 5.MD.53.~, vacuum deliveries were identified using CCI code 5.MD.54.~, and deliveries involving the sequential use of instruments were identified using the CCI code 5.MD.55.~. Forceps deliveries were grouped into the following five categories: outlet, low, midpelvic, double forceps application (e.g., Scanzoni manoeuvre), and forceps rotation with manually assisted delivery. Outlet, low, and midpelvic forceps deliveries were defined based on the Classification According to Station and Rotation.¹¹ Outlet forceps delivery was defined as forceps delivery in cases in which the scalp was visible at the introitus without separating the labia, the fetal skull had reached the pelvic floor, the fetal head was at or on the perineum, the sagittal suture was in anteroposterior position, or the position was right or left occiput anterior or posterior and rotation did not exceed 45 degrees. Low forceps delivery was defined as

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