

ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Trends in forceps deliveries in a tertiary health care facility in Serbia

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The aim of this study was to analyze the trends of forceps deliveries at the tertiary healthcare facility.

Methods The study was performed at the Clinic of Gynecology and Obstetrics, covering a 30-year period, from 1987 to 2016 with a total of 198,882 births.**Results** Forceps delivery rate was significantly lowering during time, while the cesarean section rates were rising.**Conclusion** Using linear, cubic and quadratic prediction models, we can estimate that in the year 2020 there will be no more forceps deliveries. However, minding the confidence interval of 95% some forceps deliveries might still be carried out. Since it has been shown that the forceps is a very useful obstetric tool, this very important skill might soon be neglected due to the lack of training.**Keywords:** forceps; delivery; vaginal; operative; cesarean section**INTRODUCTION**

An increase in cesarean section rates have resulted in a reduction of instrumental vaginal deliveries rates. Nowadays, increased cesarean section rates are becoming an issue, leading to some instances of a renewed interest in forceps delivery, even Kielland's rotational forceps. Nevertheless, a greater use of forceps, especially a rotational one could be associated with a much higher incidence of major maternal trauma, especially to the anal sphincter and levator ani muscles, so its use should be avoided whenever possible [1].

Operative vaginal delivery (forceps and vacuum extraction) and cesarean sections were relatively recently introduced as obstetric operations. Forceps delivery was always considered a great obstetrical challenge. What is expected from contemporary obstetrician is to be able to recognize disorders of natural birth processes following with an active intervention [2].

In some situations, forceps may be the safest option for delivery, for example, with an undiagnosed breech presentation at full cervical dilation or for delivery of the second twin. In these cases, forceps enable the controlled delivery of the fetus's head. Assisted vaginal delivery of a fetus with a face presentation can only be achieved by forceps; vacuum extraction is contraindicated. Forceps is the only option for delivery of premature fetuses because of the risk of cephalohematoma and intracranial hemorrhage with vacuum extraction. Additionally there are medical conditions (cardiac, respiratory, and neurological) that preclude maternal

effort, required for successful vacuum extraction, in the second stage of labor. Forceps may also be chosen when maternal effort is minimal secondary to epidural analgesia. Outlet forceps can be useful at caesarean section for controlled delivery of the fetal head.

Typically, forceps is used when a singleton fetus in the cephalic position fails to progress, or when delivery needs to be expedited in the second stage of labor because of fetal distress. In these instances, there may be a real choice between forceps and alternative methods of delivery: caesarean section and vacuum extraction.

Correct placement of the vacuum device or forceps is the key to safety [3]. Instrumental delivery should never be performed when the fetal head is not engaged. Transabdominal ultrasound assessment should be conducted in cases of clinical doubts about the fetal head position [4]. Malrotation and elevated numbers of traction applications may lead to neonatal head injury [5].

Generally, forceps delivery is considered to have higher success rates than vacuum extraction. However, the success rates of operative vaginal delivery will vary regarding other factors, including the range of indication, the approval for subsequent forceps after failed vacuum extraction, and the operator's proficiency and preference [6].

Neonatal sequelae are an important consideration if instrumental vaginal delivery is unsuccessful. A recent prospective study found that neonatal trauma and fetal acidosis were more common after failed instrumental

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Table 1. The number of vaginal, cesarean and forceps deliveries in the 1987–2016 period at the Clinic of Gynecology and Obstetrics, Clinical Centre of Serbia in Belgrade, Serbia

Year	Vaginal delivery		Cesarean section		Total Number	Forceps	
	Number	%	Number	%		Number	%
1987	8,254	92.46	656	7.36	8,910	139	1.87
1988	6,950	92.09	597	7.91	7,547	134	1.92
1989	7,186	91.92	632	8.08	7,818	124	1.72
1990	6,834	90.64	706	9.36	7,540	121	1.77
1991	6,611	89.29	793	10.71	7,404	126	1.91
1992	6,601	89.91	741	10.09	7,342	62	1.04
1993	6,545	89.70	751	10.30	7,296	94	1.29
1994	6,731	88.36	887	11.64	7,618	67	0.99
1995	7,256	90.49	763	9.51	8,019	109	1.50
1996	5,399	86.55	839	13.45	6,238	85	1.57
1997	2,818	78.45	774	21.55	3,592	59	2.09
1998	4,675	83.14	948	16.86	5,623	43	0.84
1999	4,511	81.50	1,030	18.50	5,541	51	1.13
2000	5,099	81.51	1,123	18.49	6,222	43	0.84
2001	5,491	81.42	1,253	18.58	6,744	53	0.96
2002	5,473	78.96	1,464	21.04	6,958	30	0.55
2003	5,415	78.72	1,464	21.28	6,879	52	0.96
2004	5,452	75.39	1,780	24.61	7,232	29	0.53
2005	5,237	74.56	1,787	25.44	7,024	21	0.40
2006	5,283	75.21	1,742	24.79	7,025	20	0.38
2007	5,241	75.86	1,668	24.14	6,909	16	0.30
2008	5,070	72.44	1,929	27.56	6,999	34	0.67
2009	4,556	69.60	1,990	30.40	6,546	16	0.36
2010	4,572	67.75	2,176	32.25	6,748	26	0.57
2011	4,290	68.86	2,224	34.14	6,514	26	0.60
2012	4,475	65.72	2,325	34.28	6,782	15	0.34
2013	4,608	68.93	2,077	31.07	6,685	17	0.36
2014	4,654	67.53	2,238	32.47	6,892	7	0.15
2015	4,026	63.15	2,349	36.85	6,375	5	0.12
2016	4,044	63.26	2,348	36.73	6,392	10	0.25

vaginal delivery than after immediate caesarean section [7]. It remains unclear whether complications in labor result in operative delivery or whether the mode of delivery itself contributes to adverse outcomes. In their large-scale retrospective cohort study, Werner et al. [8] reported that forceps delivery had a lower risk of adverse neonatal outcomes including cephalohematoma, low Apgar score, and neurologic complications and posed a higher risk of facial nerve palsy than did vacuum extraction. Although previous reports suggested that the risk of fetal injury is unacceptable, recent studies demonstrate more favorable outcomes without significant fetal or maternal morbidity, so the training in forceps deliveries should continue [9].

The aim of this study was to analyze the trends of forceps deliveries at a tertiary healthcare facility.

METHODS

This study was performed at the Clinic of Gynecology and Obstetrics, Clinical Centre of Serbia in Belgrade, a tertiary healthcare facility, covering a 30-year period, from 1987 to 2016, with a total of 198,882 births. We analyzed forceps delivery rates, indications for forceps delivery, parity

of patients and maternal morbidity after forceps delivery. Regarding neonates, we analyzed average Apgar score, birthweight and neonatal morbidity. At the same time, we analyzed cesarean section rates in same period. Statistical methods we used were descriptive statistics, percentages, as well as linear, cubic, and quadratic prediction models.

This study was conducted in accord with standards of the institutional Committee on Ethics.

RESULTS

In Table 1, the number of vaginal, cesarean and forceps deliveries in the period from 1987–2016 at the Clinic of Gynecology and Obstetrics, Clinical Centre of Serbia in Belgrade, Serbia are shown.

In the analyzed period, there were total of 198,882 births, of which 1,634 were forceps deliveries, and 55,475 were cesareans sections.

Statistically significant decrease in both vaginal and forceps deliveries was noted, while at the same time, the cesarean section rates were statistically significantly increased.

In the analyzed period, the highest forceps delivery rate was noted in the year 1997 (2.09%), and lowest in the

year 2015 (0.12%). The lowest cesarean section rate was observed in the year 1987 (7.36%), and highest in the year 2015 (36.85%).

Using linear ($R^2 = 0.947$), cubic ($R^2 = 0.944$) and quadratic ($R^2 = 0.822$) prediction models we can estimate that in the year 2020 there will be no more forceps deliveries. However, minding the confidence interval of 95%, some forceps deliveries might still be performed.

DISCUSSION

The increase of cesarean section rates is the result of virtually complete elimination of vaginal breech delivery, as well as a significant decrease in operative vaginal deliveries and vaginal birth after cesarean. In our study, covering 198,882 births, we have found a statistically significant decrease in both vaginal and forceps deliveries, and statistically significant increase the cesarean section rates. The number of forceps deliveries is closely associated with the number of vaginal deliveries, which is one of reasons for the decrease in the number of forceps deliveries. Our data is consistent with literature data regarding the decrease in forceps deliveries.

It does not matter whether cesarean section rates are high or low, but whether the appropriate performance of cesarean delivery is part of a system that delivers optimal maternal and neonatal care after consideration of all relevant patient and health system information [10]. The current study suggests, however, that efforts to reduce cesarean section rates may not improve patient outcomes. Caesarean delivery is protective against birth trauma, especially when performed without labor in comparison with vaginal delivery when operative delivery is required in the second stage of labor [11].

After a decline in the use of forceps because of adverse outcomes and fear of litigation, recent evidence suggests that they may be safe and effective in trained hands regarding the increased short and long-term morbidity related to cesarean section compared with the reduced morbidity of subsequent pregnancy after operative vaginal delivery [12].

When complications arise in the second stage of labor, there is a choice between an instrumental vaginal delivery and a caesarean section. Obstetric forceps is potentially dangerous in the hands of untrained or inexperienced obstetricians.

The failures in forceps deliveries are usually related to inaccurate assessment of the fetal position and station, which can be overcome by gaining enough clinical experience and using intra-partum ultrasound scanning to determine the fetal head position in the second stage, and

should be part of the core curriculum in obstetric training [13].

Women are more likely (over 75%) to choose a future vaginal delivery after one successful forceps delivery than after a caesarean section (almost 25%) [14].

Instrument-assisted vaginal delivery is a significant risk factor for birth canal lacerations. Protection against extensive perineal tearing may prevent obstetric anal sphincter injuries [15].

In our study, using prediction models we estimated that in the year 2020 there will be no more forceps deliveries, however, minding the confidence interval of 95% some forceps deliveries might still be performed. The limited use of forceps is due to the lack of training and the situation in our facility is no different. This is a new educational challenge for teaching and development of clinician's skills with careful assessment and knowing when to stop if safety criteria are not met [16].

To enable women to make an informed choice about the mode of delivery, obstetricians need to be adequately trained and supervised in the use of forceps. The American College of Obstetrics and Gynecology has recommended training in instrumental delivery to control and reduce the rates of caesarean sections. Current minimum training for forceps delivery is insufficient to ensure obstetricians' competency, leading to the inevitable disappearance of this valuable skill. The prospects are to abandon the attempts to teach forceps and prepare residents for practice, which does not include the availability of forceps delivery, or to prioritize the development of simulation models that would allow them to obtain sufficient training in forceps delivery, which is the only alternative to the inevitable extinction of the forceps [17].

CONCLUSION

After analyzing the trends of vaginal, forceps and cesarean section delivery rates, a statistically significant decrease was found in both vaginal and forceps deliveries, while at the same time, the statistically significant increase of cesarean section rates. Using linear, cubic and quadratic prediction models we can estimate that in 2020 there will be no more forceps deliveries. With the confidence interval of 95% some forceps deliveries, however, might still be performed. The reasons for the decline in the use of a forceps are the fear of maternal and fetal injuries and medicolegal issues. Since it has been shown that the forceps is a very useful obstetric tool, this extremely important skill might soon be neglected due to the lack of training.

Conflict of interest: None declared.

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Тренд порођаја форцепсом у терцијарној установи у Србији

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САЖЕТАК

Увод/Циљ Повећана учесталост царских резова довела је смањења учесталости инструменталног вагиналног порођаја. Циљ студије био је да се анализира тренд порођаја форцепсом у терцијарној установи.

Метод Студија је спроведена у Клиници за гинекологију и акушерство у периоду од 1987. до 2016. године и обухватила је 198.882 порођаја.

Резултати Учесталост порођаја форцепсом се значајно смањила током времена, док је учесталост царског реза у порасту.

Закључак Користећи линеарне, кубне и квадратне моделе предикције, процењује се да у 2020. години више неће бити порођаја форцепсом. Имајући у виду интервал поверења од 95%, могуће је да ће се понеки порођај форцепсом ипак спровести. С обзиром на то да је форцепс веома користан инструмент, вештина његове употребе може нестати због неадекватне обуке акушера.

Кључне речи: форцепс; порођај; вагинални; оперативни; царски рез