



Time series analysis of the frequency of neonatal palsy in Al-Zahra hospital in Rasht

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Abstract

Introduction: Erb-Duchenne paralysis is the most common form of neonatal brachial plexus palsy. Cesarean section is one of the protective factors in Erb paralysis.

Materials and Methods: The data were related to mothers who gave birth by both natural and cesarean section during the study period in Al-Zahra Hospital in Rasht, as well as their infants. The number of cases of Erb paralysis during one-month periods was identified and for the mentioned period, the interrupted time series analysis or ITSA method was calculated and its changes were measured. Other variables including maternal age at delivery, weight of newborns at birth and total number of deliveries by delivery method were extracted and recorded from the maternity and neonatal registry.

Results: In this study, 7 cases of neonatal paralysis were recorded, which indicates an incidence of 0.17 cases per 1000 births, of which 6 cases were registered after the implementation of the Health Transformation Plan. Considering the confounding variables, the number of cases of Erb paralysis during the period after the implementation of the health system transformation plan has an upward trend compared to before its implementation, which according to $P = 0.079$, this difference with a 90% confidence interval is significant. have been. Also, deliveries performed by cesarean section have increased from 60.1% before the transformation plan to 64.1% after the transformation plan.

Conclusion: This study showed that the incidence of Erb paralysis in Al-Zahra Center is lower than other incidence in other studies in other countries. Also, due to its higher incidence in normal deliveries, in addition to reducing the rate of cesarean section to maintain the health of mother and baby, special attention should be paid to increasing the likelihood of some complications following a normal delivery.

Keywords: Erb paralysis, Health system transformation plan, Cesarean section, Natural childbirth

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Introduction

At the root of the neck, the nerves form a complex network called the brachial plexus. This causes the nerve fibers derived from different segments of the spinal cord to be organized and to travel appropriately to different parts of the upper limb in different nerve trunks. The brachial plexus consists of the junctions of the anterior branches of the fifth, sixth, seventh, and eighth cervical nerves (C5 to C8) and the first thoracic spinal nerve (T1). This network can be divided into roots, trunks, branches and ropes. The roots C5 and C6 join together to form the upper trunk, the root C7 travels as the middle trunk, and the roots C8 and T1 join together, and the lower trunk constitute (1). Each trunk is divided into anterior and posterior sections to form ropes, which are then divided into branches to feed the arm muscles. Injuries to the brachial plexus may be mild and with a temporary complication, or they may be destructive and cause the child's arm to remain numb (2).

Retinal detachment injury is one of the most common neonatal injuries, occurring at about 1.51 per 1,000 live births in the United States (3) and reports from 0.38 (4) to 5.8 (5). Is variable at each live birth. Neonatal brachial plexus paralysis is not a new finding. In the mid-18th century, a physician named William Smellie, a leading gynecologist in Britain, wrote about a child born with a facial presentation. Using forceps, she carefully delivered the baby, stating that the long time the baby spent in the birth canal paralyzed her arms for several days. Later in the mid-19th century, Guillaume Benjamin Amand Duchenne and Wilhelm Heinrich Erb described lesions that resulted in weakness and inability of the proximal upper extremities in the deltoid and biceps muscles and referred to the C5 and C6 roots of the neck as They introduced the most common site of injury (6), which is now called Erb-Duchenne palsy. Erb paralysis is the most common form of network injury. In 1885, Klumpke described paralysis of the lower arm network as a weakness of the hand and the maintenance of strength in the proximal part of the upper limb with unilateral Horner syndrome and identified the T1 and C8 nerve roots as the most common site of injury (6). The severity of injury in neonatal brachial plexus paralysis depends on the

number of nerves involved and the degree of damage at each level.

To differentiate the severity of peripheral nerve damage, differentiation of neurapraxia, axonotmesis, neurotmesis is helpful.

Pure norepinephrine lesions do not affect the axon itself. These lesions are generally reversible and leave no complications. Axonotmesis lesions include rupture of the myelin sheath and axons, leading to the destruction of the distal axon at the site of injury. Connective tissue remains intact throughout the lesion. Based on the level of damage, these lesions gradually heal over 4-6 months. Neurotmesis injuries are the most severe type of injury, destroying not only the axons and myelin but also the supporting structures around the nerve (7).

Many cases of temporary brachial plexus paralysis are associated with a complete improvement in the baby's function in the first week of life (8). Dysfunction persists in a smaller percentage of children and leads to long-term disability. Treatment of these children is based on physical or occupational therapy in conjunction with a regular exercise program at home (2). Some selected patients may benefit from early intervention surgery (9). Other non-surgical treatments, including electrical stimulation and botulinum toxin injection, may be effective in treating patients with brachial plexus paralysis (2).

Materials and Methods

This study is a quasi-experimental study that aimed to analyze the time series of frequency of neonatal paralysis in Alzahra Hospital, Rasht, the incidence of neonatal paralysis and the effect of health system transformation plan on delivery performance in Rasht in Alzahra Hospital. In this study, information about mothers and infants from the beginning of 2010 to the end of June 2009 was collected from the maternity registration database of Al-Zahra Hospital in Rasht, maternity and infant information registration offices, as well as patient records.

The data were related to mothers who gave birth by both natural and cesarean section during the study period in Al-Zahra Hospital in Rasht, as well as their infants whose information is in the files and offices

(Table 1). Information registration was fully available. The hospital is the most important center for mother and child services in Guilan province and many deliveries in the province are performed in this hospital. In this study, the number of cases of Erb paralysis during one-month periods was identified and calculated for the mentioned period and its changes were measured. Other variables including maternal age at delivery, the weight of newborns at birth and the total number of deliveries by delivery method (normal delivery and cesarean section) were extracted and recorded from the maternity and neonatal registry. Regarding the number of cases of clavicle fractures, the number of cases of double or multiple twins, and the number of cases of shoulder fractures, we refused to examine these variables due to insufficient data.

Results

According to the collected data, 38,287 deliveries were performed in Al-Zahra Medical Center in Rasht during the study period, of which 23,910 (62.45%) were by cesarean section and 14,368 (37.50%) were by cesarean section. Normal delivery is performed. The method of delivery in 9 cases was also unknown. 15941 (41.60%) cases of deliveries were performed before the start of the health system transformation plan, of which 9583 (60.1%) were performed by cesarean section and 6358 (39.9%) were performed by natural delivery method. Has been.

Also, 22,346 (58.40%) cases of deliveries have been performed after the start of the health system transformation plan, of which 14,327 (64.1%) were by cesarean section and 8010 (35.8%) were by cesarean section. Normal delivery is performed.

During the study period, 7 cases of neonatal paralysis were recorded, which indicates an incidence of 0.17 cases per 1000 births. One in seven cases of Erb paralysis was registered before the start of the health system transformation plan. The incidence of Erb paralysis from 2010 until before the implementation of the Health Transformation Plan was 0.05 cases per 1000 births, while this number was 0.27 per 1000 births after the implementation of this plan. In our study, information was available on 6 of 7 cases of Erb paralysis, all of which weighed less than 4,000 grams.

Table 1. Table 1. Information of related to mothers who gave birth by both natural and cesarean section.

	Before the Health Transformation Plan	After the Health Transformation Plan	Total
Natural childbirth	6358	8010	14368
Cesarean section	9583	14327	23910
Unknown	0	9	9
Total	15941	22346	38287

The number of cases of Erb paralysis without considering dependent and confounding variables during the period after the implementation of the health system transformation plan has a different and upward trend than before its implementation, which according to $P = 0.063$ = this difference with the distance 90% confidence was significant (Table 2). There was no statistically significant difference in the number of cases of Erb paralysis during the whole study period, regardless of the health system transformation plan ($P = 0.311$). Also, immediately after the implementation of the Health Transformation Plan, there was no statistically significant difference in the number of cases of Erb paralysis ($P = 0.568$).

Considering the average monthly age of mothers, the average monthly weight of newborns and the ratio of the number of cesarean sections to the total number of deliveries as confounding variables, the number of cases of Erb paralysis during the period after the implementation of the health system transformation plan Before its implementation, it had an upward trend, which according to $P = 0.079$, this difference was significant with a 90% confidence interval. There was no significant difference concerning $P = 0.703$ and also in the general trend of the number of cases of Erb paralysis during the whole period without considering the implementation of the health system transformation plan ($P = 0.184$) was not found.

Table 2. Statistical date related to infants and mothers.

	The correlation coefficient	Statistics (t)	P-value
Average monthly age of mothers	0.0557867	1.39	0.167
The ratio of the number of cesarean sections to the total number of deliveries	0.0987298	0.19	0.852
Average monthly weight of infants	0.0002289	0.61	0.541
Number of Erb paralysis in the whole study period	-0.0004364	-1.34	0.184
Number of paralyzes immediately after the start of the transformation plan	0.0275358	0.38	0.702
Number of Erb paralysis in the period after the transformation plan	0.0009252	1.78	0.079

Discussion

In the present study, 15,941 (41.60%) cases of deliveries were performed before the start of the health system transformation plan (from the beginning of 1389 to before May 1393) and 22,346 (58.40%) cases of deliveries. After the start of the health system transformation plan, in fact, before the start of the health transformation plan, an average of about 325 deliveries were performed per month; If after the implementation of the health system transformation plan, an average of about 360 deliveries have been performed per month. In the study of Sadeghi Moghadam et al., Which was conducted in the years 1391 to 1395, the number of deliveries performed in the teaching hospital studied after the Health Transformation Plan has increased by about 20%, which is consistent with the results of our study. Is on the same side. Among the reasons for this increase can be mentioned the announcement of population growth policies in the country (10). According to the present study, the average monthly age of mothers during the entire study period increased significantly and also decreased significantly in the period after the health transformation plan compared to before.

One of the limitations of this study is that only deliveries performed in a public hospital were examined and deliveries performed in other hospitals under the supervision of Guilan University of Medical Sciences were included. It cannot, therefore, it may not be able to accurately indicate the percentage of deliveries performed by cesarean section and the

impact of the health system transformation plan on it in the centers under the supervision of Guilan University of Medical Sciences. Also, since Al-Zahra Hospital is the only level three hospital in the field of childbirth in Guilan province and there is more access to obstetricians in this center, one of the reasons for these results could be the possible referral of cases with cesarean indications from Other centers should be referred to Al-Zahra Educational and Medical Center for delivery, but to prove this hypothesis, more detailed information and further studies should be performed by sampling from all hospitals under the supervision of Guilan University of Medical Sciences, as well as careful study of indications for delivery. The cesarean section method is performed separately by the center. The distribution of cases may not be uniformly indicated by cesarean section. Other limitations of this study include the fact that several cases of Erb paralysis may not be diagnosed at birth and that the baby's upper extremity problems may be suspected at home by the parents or at the baby's visit. Be diagnosed in pediatric clinics. If these cases exist, they will refer to other centers for further investigation and treatment, so they will not be notified to Al-Zahra Educational and Medical Center in Rasht, so they were not included in our study.

One of the important aspects of the health system transformation plan was the program to promote natural childbirth and the related costs to be free in the educational and medical centers related to medical universities across the country. It was expected that with the correction of this section, the number of

deliveries performed by cesarean section would decrease and the rate of normal deliveries would increase. The present study shows that not only the percentage of deliveries performed by cesarean section has not decreased, but also this percentage has increased in Al-Zahra Medical Center in Rasht and has increased from 60.1% to 64.1%. Has found. Irrespective of not reducing the rate of cesarean section after the health system transformation plan, this rate of deliveries performed by the cesarean section method is more than the amount specified in the goals of the natural childbirth program. Because our study examined only deliveries performed in a public hospital and did not include deliveries performed in other hospitals under the supervision of Guilan University of Medical Sciences, so perhaps It cannot accurately indicate the percentage of deliveries performed by cesarean section and the effect of the health system transformation plan on it in all centers under the supervision of Guilan University of Medical Sciences. Also, since Al-Zahra Hospital is the only level three hospital in the field of childbirth in Guilan province and there is more access to obstetricians in this center, one of the reasons for these results could be the possible referral of cases with cesarean indications from other centers should be sent to Al-Zahra Medical Training Center for delivery. The distribution of cases may not be uniformly indicated by cesarean section, in which case one of the reasons for this rate of the cesarean section will be to prioritize the health of mothers and their infants. Of course, proving this hypothesis requires more accurate information and further studies by sampling all hospitals under the supervision of Guilan University of Medical Sciences and also a detailed study of the indications for cesarean delivery by the center. Of course, it should also be noted that based on the overall goal of the health system transformation plan, each university, hospital and obstetrician were obliged to reduce the rate of cesarean section by 2.5% every three months. In such a way that at the end of six months, the base rate decreases by 5% and at the end of the year, by 10%. But regardless of whether the transformation plan has been able to reduce the rate of cesarean section in our educational and medical center or not, it is important that one of the goals of reducing the rate of cesarean section in the world and also the plan to transform the health system in Iran, Prevention of complications of cesarean

section. In various studies, the rate of respiratory distress and tachypnea in normal delivery has been reported less (11,12). But the complications of natural childbirth should not be overlooked. Sometimes pressure on the fetal umbilical cord reduces oxygen supply or poses risks such as bruising and, in some cases, bone fractures to the baby as it passes through the birth canal. Other studies have reported a higher risk of trauma to the baby after a normal birth (13,14). In our study, as mentioned, the health system transformation plan has increased the incidence of neonatal paralysis in the aftermath, which has been significant with a 90% confidence interval. Of course, it should be noted that there is no certainty inaccurately recording cases of Erb paralysis, and it also does not seem logical that this small number of Erb paralysis recorded during the study period calls into question the benefits of natural childbirth and make major changes to the instructions. Therefore, it is suggested that studies in this direction be done in the future by removing the mentioned restrictions.

Conclusion

This study showed that the incidence of Erb paralysis in Al-Zahra Center is lower than other incidence in other studies in other countries. Also, due to its higher incidence in normal deliveries, in addition to reducing the rate of cesarean section to maintain the health of mother and baby, special attention should be paid to increasing the likelihood of some complications following a normal delivery.

Author contributions

SAGhA, PM, EHR, MRT, ZPH and KD wrote, collected and edited the revised version of the manuscript.

Conflict of interest

The authors declare that they have no conflicts of interest.

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