Original Article

Efficacy of a Novel Site of Tactile Stimulation (Partha's site) for Neonatal Resuscitation – A Prospective Interventional Study

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ABSTRACT

Background: Traditional tactile stimulation methods in neonatal resuscitation involve stroking or tapping the back of the infant. However, a recent study has investigated additional tactile stimulation areas, such as the baby's feet, with a high concentration of nerve endings. In this connection, the primary author has selected a bilateral inguinal crease as an alternate site for tactile stimulation. This study examines the effectiveness of this novel stimulation site in generating crying in noncrying neonates. **Methodology:** A prospective interventional study was conducted in an established obstetric hospital from February to November 2023. The study population comprised 100 noncrying infants who did not respond to conventional tactile stimulation. The outcome variables included maternal age, gestational age, birth weight, grimace and respiration scores of Apgar, and the time taken to achieve the maximum score after stimulation. **Results:** Most neonates (71%) achieved a grimace score of 2 after stimulation, and the mean time to achieve this response was 1.39 (2) s. Seventy-six percent of neonates achieved a respiration score of 2 after stimulation, and the mean time to achieve it was 2.24 (0.5) s. Furthermore, 98% of infants had a favorable outcome without further invasive interventions. **Conclusion:** The novel site of bilateral inguinal stroking is an effective tactile stimulation site in neonatal resuscitation. The findings suggest that this approach may provide a quicker and more consistent response, reducing the need for positive pressure ventilation and potentially improving neonatal outcomes.

Keywords: *Inguinal crease, neonate, resuscitation, site, tactile stimulation*

Introduction

Neonatal resuscitation is a life-saving emergency medical procedure that tries to help newborns who are experiencing challenges adjusting to the extrauterine environment. While the resuscitation procedure includes several steps and strategies, tactile stimulation is one of the most important. Stimulation is an essential initial step in reawakening a nonresponsive newborn to allow them to start breathing independently. Recently, there has been a rising emphasis on optimizing stimulation techniques and locales to improve their effectiveness. The infant's back has traditionally been the most widely used place for stimulation in neonatal resuscitation, specifically by gently massaging or tapping the baby's back. This procedure has proven helpful in many cases. However, as medical knowledge progresses, medical professionals always look for ways to improve the resuscitation process and neonatal outcomes.[1] There has recently been a movement toward researching new stimulation sites with better efficacy. The baby's feet as a site is one of the emerging attractions gaining popularity. The reasoning behind this alteration stems from a knowledge of sensory networks in infants. Because the soles of

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an infant's feet contain a high concentration of nerve endings, the researchers may consider them as a more effective site of stimulation.[2]

In this study, we tried to use a novel site (bilateral inguinal crease) as the site of stimulation in noncrying babies and estimate its efficacy in inducing crying. The site was not evidence-based but with the personal experience of the primary author for two decades.

Methodology

Study design

This was a prospective interventional study.

Study primer

The study was conducted after ethical committee approval (IRBSTH 103/2023-enclosed) in an established obstetric hospital from February 2023 to November 2023. The study was done according to the principles of the Declaration of Helsinki. Parental consent was taken after the intervention, explaining that consent is not feasible in an emergency.

Sampling

During admission, women in labor with a gestational age of more than 34 weeks and a confirmed fetal heart rate, admitted for cesarean section, were contacted for consent. Neonates who were actively crying at birth were not eligible for this study. The study population consisted of noncrying infants who received conventional tactile stimulation and did not respond. Extremely preterm babies were not included. Babies who cried immediately after birth and those who had birth abnormalities were not included in the study. The study also excluded neonates who did not cry and were not aroused with no cardiac activity. The sampling method was taken by a convenient sampling method of the first 100 neonates with inclusion criteria.

Data variables

The maternal age, gravida, and gestational age were noted. The cases were posted for urgent, elective, or emergent cesarean section. The babies that were noncrying during the routine tactile stimulation were given one stroke of bilateral inguinal stimulation [Partha's site Figure 1]. Grimace and respiratory scores were noted before and after the novel site stimulation [Figure 2]. The time taken to achieve the best possible scores was noted [Video 1]. If the stimulation of the new site did not produce the desired response, the established resuscitation protocol was continued. Any other side effects of skin changes at the stimulation site were noted. Any satisfactory outcome means the baby cried well and maintained to discontinue any form of stimulation further. Any other bad outcomes were also noted.

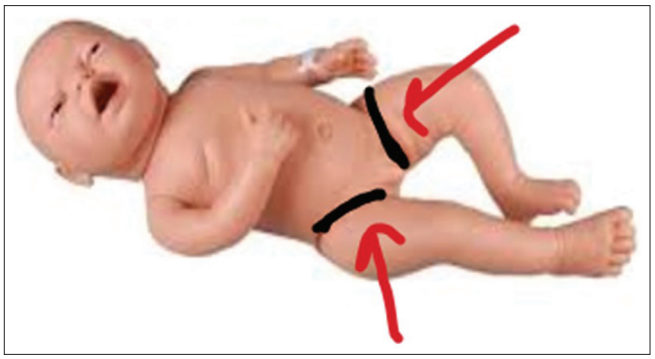

Figure 1: Novel site (Partha's site) of tactile stimulation. Arrow mark indicates the novel site

Statistics

The mean and standard deviation of the time taken to achieve maximum or best grimace and respiration scores were recorded. The percentage of patients with satisfactory outcomes was also noted. The Student's paired *t*-tests were used to compare the improvement of scores. A $P < 0.05$ was considered statistically significant. Wilcoxon signed rank sum test was used to analyze the ranking scores improvement.

Results

Among the 100 neonates, 98 were delivered by cesarean section, and two were born vaginally in the operation theatre. The demographic data are presented in Table 1. The grimace scores of 64% of neonates were at 0 while 36% had one before intervention. After stroking the inguinal region, it improved to a score of 2 in 71% of the neonates and to a score of 1 in the remaining 29% [Table 2]. On applying the Wilcoxon rank sum test, it is observed that Z is - 4.5029, which is <2.578. Therefore, the null hypothesis was rejected with a $P < 0.005$.

Regarding respiration, 84% of neonates had a score of zero, which improved to a score of 2 among 76% of them postintervention with a $P < 0.00001$ [Table 3]. The mean time to achieve the maximum score of 2 after the stimulation of the novel site was 1.39 ± 0.2 s [Table 4].

Eighty-eight percent of infants had a good outcome without further interventions. In comparison, 10% needed minimal interventions with oxygen supplementation and continuous positive airway pressure ventilation. Two of the infants did not develop any respiratory effort or activity with this technique, and, therefore, needed further resuscitation and intubated later. They were discharged after 10 days.

Discussion

Tactile stimulation is integral to neonatal resuscitation because it helps a newborn start breathing and transition to extrauterine life. The location of stimulation is an

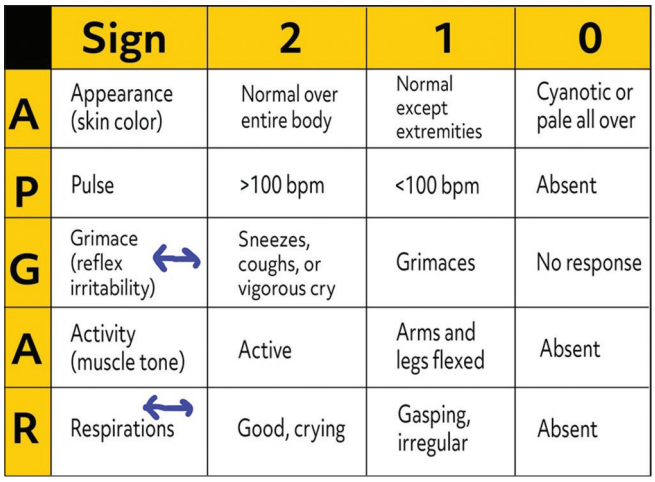

Figure 2: Apgar scores and our variables in blue arrows

important aspect that can have positive and negative consequences. A swift response with dependable efficacy is needed. While overstimulating the area may cause injuries, inefficiency and individual variability are drawbacks.[2] The positive side is that when a newborn suffers from primary apnea, any stimulation (for example, drying, the suction process, or tactile stimulation) will stimulate breathing. The adverse consequence is that if the newborn remains apneic and no kind of stimulation works, the following suitable action is to start positive pressure ventilation (PPV) immediately to reduce the risk of extending anoxia. In our case, we wanted to try our site of bilateral inguinal stroke before proceeding to PPV. Kaufmann *et al*.[3] have stated that multiple-site stimulation evokes a better response than single-site stimulation in preterm infants. Dekker *et al*.[4] have proved that tactile stimulation is essential for neonates, and using this less has caused more intubations in preterm infants. They also described that there are a lot of variations in tactile stimulation among specialists. Repeated stimulation can cause better results in the same site.[5] Infants received tactile stimulation over a median period of 15 s up to 86 s. However, Gaertner *et al*. did not describe the overall duration of tactile stimulation. Less mature infants are stimulated less often than more mature infants and many very preterm infants are not aroused. As indicated by resuscitation standards, most infants were aroused within the 1st min. Although rubbing the trunk may be the most beneficial, this must be proven in future trials.[6] We propose that we do not need to wait for 86 s. Instead, wait for 5–10 s, proceed with inguinal stimulation, and decide on the need for PPV, which may result in better neonatal outcomes. Our study established that a waiting 2–3 s is only needed to switch to PPV. Kc *et al*.[7] have found that noncrying newborns who were stimulated with an intact cord had more significant

Table 1: Baseline demographic data

Variables	Mean±SD
Maternal age (years)	26.7±3.6
Gestational age (weeks)	37.3±0.8
Birth weight (kg)	2.88±0.3

Values are expressed as mean±SD. SD: Standard deviation

Table 2: Comparison of grimace scores before and after intervention

Grimace score	*n*=100
Preintervention	
Score 0	64
Score 1	36
Postintervention	
Score 1	29
Score 2	71*

*P<0.005. Values are expressed as absolute numbers

Table 3: Comparison of respiration scores before and after intervention

Respiration score	*n*=100
Preintervention	
Score 0	84
Score 1	16
Postintervention	
Score 1	24
Score 2	76*

*P<0.005. Values are expressed as absolute numbers

Table 4: Mean time taken to achieve the best or maximum score

Time taken (s)	Mean±SD
For grimace score	1.39±0.2
For respiration score	2.24±0.5

Values are expressed as mean±SD. SD: Standard deviation

spontaneous breathing than infants who were stimulated with a clamped cord. Although intact cord stimulation may aid in establishing spontaneous breathing in apneic newborns, residual confounding variables may be issues. In our study also, there are a lot of confounding variables, but the response was very consistent to report. There is a theory that increased nerve endings, and nociceptors are the reason for increased tactile stimulation response to feet.[8] However, we feel that there may be excessive nerve endings in our novel site to explain our results possibly. We had a faster and more robust response in our neonates to support the same. Pepino and Mezzacappa,[9] in their systematic review on the subject, have concluded that the tactile stimulation system has not been standardized regarding site and timing. Hence, we propose this new site and open the gates of research for randomized trials with

this site. The most significant drawback of our study is that the confounding variables are not standardized and a few observations were mainly experience-based and not precisely on established evidence.

Conclusion

The study concludes that a novel site (Partha's site of bilateral inguinal stroking) is efficient as a tactile stimulation site in neonatal resuscitation. This study needs further confirmation with a large sample size with controlled studies.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. O'Donnell CP, Gibson AT, Davis PG. Pinching, electrocution, ravens' beaks, and positive pressure ventilation: A brief history of neonatal resuscitation. Arch Dis Child Fetal Neonatal Ed 2006;91:F369-73.
2. Kalaniti K, Chacko A, Daspal S. Tactile stimulation during newborn resuscitation: The good, the bad, and the ugly. Oman Med J 2018;33:84-5.
3. Kaufmann M, Mense L, Springer L, Dekker J. Tactile stimulation in the delivery room: Past, present, future. A systematic review. Pediatr Res 2022;Epub ahead of print. [doi: 10.1038/s41390-022-01945-9].
4. Dekker J, Martherus T, Cramer SJ, van Zanten HA, Hooper SB, Te Pas AB. Tactile stimulation to stimulate spontaneous breathing during stabilization of preterm infants at birth: A retrospective analysis. Front Pediatr 2017;5:61.
5. Dekker J, Hooper SB, Martherus T, Cramer SJ, van Geloven N, Te Pas AB. Repetitive versus standard tactile stimulation of preterm infants at birth – A randomized controlled trial. Resuscitation 2018;127:37-43.
6. Gaertner VD, Flemmer SA, Lorenz L, Davis PG, Kamlin CO. Physical stimulation of newborn infants in the delivery room. Arch Dis Child Fetal Neonatal Ed 2018;103:F132-6.
7. Kc A, Budhathoki SS, Thapa J, Niermeyer S, Gurung R, Singhal N, *et al.* Impact of stimulation among non-crying neonates with intact cord versus clamped cord on birth outcomes: Observation study. BMJ Paediatr Open 2021;5:e001207.
8. Kattwinkel J, editor. Textbook of Neonatal Resuscitation. 6th ed. Elk Grove Village: American Academy of Pediatrics and American Heart Association; 2011.
9. Pepino VC, Mezzacappa MA. Application of tactile/kinesthetic stimulation in preterm infants: A systematic review. J Pediatr (Rio J) 2015;91:213-33.