Hydrotherapy for Improving Suck-Swallow-Respiration Coordination in a Premature Infant with Feeding Difficulty

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Introduction

Premature infants experience feeding difficulty due to immature development of the autonomic nervous system. Hydrotherapy provides multiple sensory stimuli through buoyancy, relative density, water temperature, viscosity, resistance, and vestibular input and has been shown in previous studies to decrease heart rate and respiratory effort, improve abnormal muscle tone, and induce sucking tendency in neonates. Bottle feeding ability is improved due to optimization of suck-swallow-respiration ratio. We report one premature infant with feeding difficulty who benefited from hydrotherapy.

Figure 1. BIOPAC MP150 Systems

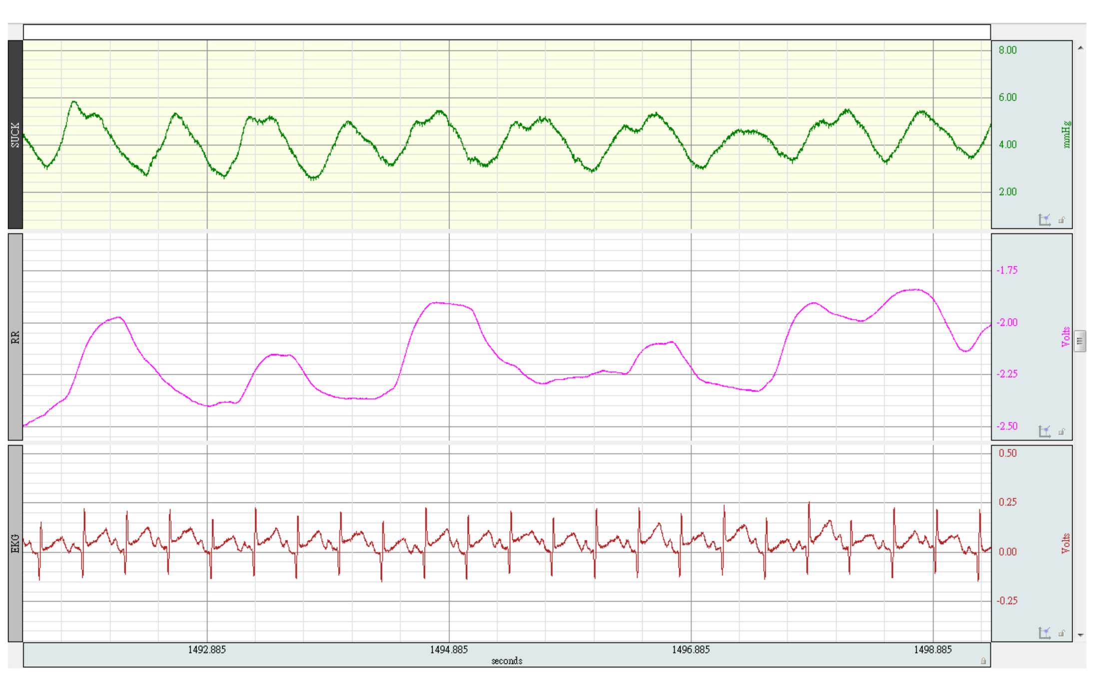

Figure 2. AcqKnowledge Data Acquisition and Analysis Software

Materials and Methods

A premature infant had the gestational age of 25 + 4/7 weeks and birth weight of 760 g (twin A). He had the personal history of respiratory distress syndrome grade II, bronchopulmonary dysplasia, necrotizing enterocolitis, patent ductus arteriosus closure by ligation, retinopathy of prematurity, neonatal sepsis, and bilateral inguinal hernia. We enrolled him in our scheduled rehabilitation program when his post-menstrual age was 30 + 4/7 weeks, body weight was 1100 g, and respiratory pattern was stable on nasal CPAP with tolerance of room air limited to one hour without ventilator support. Due to difficult progression in bottle feeding despite a stable respiratory condition, he was selected for hydrotherapy when his corrected age was 25 days and body weight was 3520 g. The infant was wrapped in a towel and carefully placed into a liquid environment where water was filled up to the newborn's shoulders. Water temperature was maintained at 37 C. Hydrotherapy comprised of passive mobilizations of the upper and lower limbs, global stretching, trunk rotation, and tactile, proprioceptive, and vestibular stimulation. After 10 minutes of treatment, the infant was wrapped in a towel and placed in a crib. Physiological data was collected 10 minutes before and immediately after treatment. Feeding with 20 ml of breast or formula milk began immediately after post-treatment data was collected.

Results

Data collected over 3 sessions of hydrotherapy during a time period of 6 days showed a decrease in heart rate immediately following treatment. Respiratory rate did not reveal a noticeable change when compared to pre-treatment data but respiratory time was increased while diaphragm expansion was decreased. There was a noticeable increase in sucking time during each session of treatment. The total time required to finish 20 ml of milk also showed remarkable improvements from session to session.

Conclusion

Proper suck-swallow-respiration coordination is required for successful bottle feeding in newborns as it provides sufficient time for inhalation, exhalation, and swallowing. Aspiration is minimized when swallowing occurs during a safer phase of respiration, namely the end-inspiration and expiration phases. Through its reduction of heart rate, respiratory effort, and abnormal muscle tone, hydrotherapy allowed our infant to improve his bottle feeding ability at a faster rate than other infants with a similar gestational age who did not receive treatment.

	1st Session	2nd Session	3rd Session
Heart rate (/min)	155.56	166.81	148.84
Respiratory rate (/min)	63.45	16.17	9.97
Respiratory power (volts)	0.16	0.38	0.35
Sucking time (seconds)	0.76	0.82	0.89
Sucking power (mmHg)	1.08	0.40	0.97
Time to finish 20 ml	**Incomplete**	**6 min 4 secs**	**4 min 52 secs**

Table 1. Post-Hydrotherapy Sucking Performance

References

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