

Dysphagia in Encephalopathic Neonates Treated with Hypothermia

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Abstract

Objective: The purpose of this study is to determine the rates of dysphagia in neonates treated with targeted body temperature reduction as compared to neonates who have not been exposed to hypothermia.

Methods: We performed a retrospective study of encephalopathic neonates who were treated with hypothermia and who underwent a modified barium swallow (MBS). For comparison, a group of neonates who had been evaluated with MBS but did not receive hypothermic therapy was identified. MBS results were qualified as either normal or abnormal.

Results: There was no statistically significant difference in the percentage of abnormal MBS results between the hypothermic and control groups (Fisher's exact; $P = 0.78$). The odds ratio for abnormal MBS results in the hypothermia group relative to the control group was 1.2, with 95% confidence interval of 0.42 to 3.8.

Significance: These data indicate that hypothermia does not seem to increase the short term risk of dysphagia in encephalopathic neonates. This supports previous findings that hypothermia is a safe treatment for neural injuries in NICU patients.

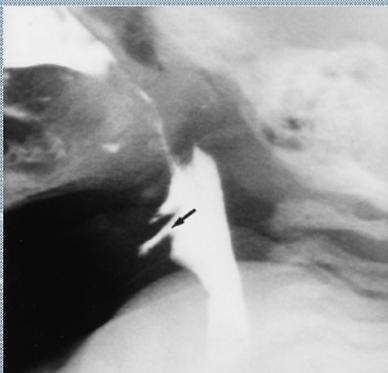


Figure 1: Single image captured from a MBS study

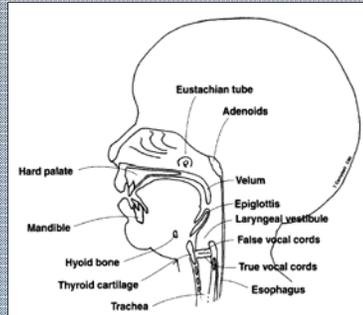


Figure 2: Anatomy of the infant larynx and pharynx

Introduction

Previously, clinicians at our institution and their colleagues noted a seemingly increased rate of abnormal MBS results in neonates treated with hypothermia. This study was conceived to formally investigate swallowing dysfunction in encephalopathic neonates treated with therapeutic hypothermia. To our knowledge, this is the first study to address a possible association of hypothermia with swallowing dysfunction.

At our institution, neonates diagnosed with encephalopathy are routinely treated with targeted body temperature reduction. When dysphagia is clinically suspected in neonates, swallowing function can be evaluated with a modified barium swallow (MBS). This videofluoroscopic test provides dynamic images of the oral, pharyngeal and esophageal phases of swallowing. This exam is useful for assessing the integrity of the swallowing reflex and for determining the consistencies of formula least likely to result in aspiration.

Dysphagia is a prevalent and persistent problem for children who survive early, severe neurological injury. Unfortunately, neonates are an under-represented patient group in the organized studies addressing the subject. Given the potential sequelae of swallowing dysfunction and aspiration, it is very plausible that clinically occult dysphagia could significantly impact the morbidity and mortality of this already fragile patient population.



Figure 3: Example of cooling blanket setup

Methods

Hypothermia Group Inclusion Criteria: We retrospectively identified neonatal intensive care unit (NICU) patients at our institution from January 2009 to December 2010 who underwent hypothermia for treatment of encephalopathy and who received at least one MBS study within the neonatal period.

Hypothermia Protocol: The hypothermia protocol was initiated within six hours of injury and consisted of either a Cool Cap (selective head cooling) or cooling blanket (whole body cooling). Target body temperature for the cooling blanket was 33.5 degrees Celsius. Target body temperature for the Cool Cap was 34.5 degrees Celsius. Hypothermia was maintained for 72 hours at which point patients were re-warmed at a rate of 0.5 degrees Celsius per hour.

Control Group: We retrospectively identified NICU patients at our institution from January 2009 to December 2010 who did not receive hypothermic therapy, but who did undergo at least one MBS study within the neonatal period.

Exclusion Criteria: Patients with a birth weight less than 1800 grams or gestational age less than 36 weeks were excluded from this study. In addition, patients with a diagnosis that would likely confound MBS results such as: tracheo-esophageal fistula (TEF), esophageal atresia, Down syndrome, and/or micrognathia were excluded.

Results

Thirty-three neonates were identified in the hypothermia group. The control group consisted of thirty-five neonates. The hypothermia and control groups had similar mean gestational ages [mean +/- standard deviation (SD): hypothermia 39.1 +/- 1.6 weeks; control 38.7 +/- 1.5 weeks] and similar mean birth weights (mean +/- SD: hypothermia 3470 +/- 545 grams; control 3183 +/- 366 grams). Likewise, the two groups underwent MBS at similar ages (mean +/- SD: hypothermia 11.2 +/- 5.6 days; control 15.3 +/- 6.6 days).

MBS results for the two groups are presented in Table 1. There was no statistically significant difference in the percentage of abnormal MBS results between the hypothermic and control groups (Fisher's exact; $P = 0.78$). The odds ratio for abnormal MBS results in the hypothermia group relative to the control group was 1.2, with 95% confidence interval of 0.42 to 3.8.

	Hypothermia (N = 33)	Control (N = 35)
Normal MBS	24 (73)	27 (77)
Abnormal MBS	9 (27)	8 (23)

Table 1: Results given as n (%)

Conclusions

We report no statistically significant difference in swallowing dysfunction between neonates treated with hypothermia and normothermic neonates. This supports the supposition that hypothermia is a safe therapy for treatment of neural injury in neonates. In light of the surprisingly high percentage of abnormal MBS results in both the hypothermic and normothermic groups, it may be prudent to increase surveillance for swallowing abnormalities amongst neonates admitted to the NICU. Clinicians should maintain a high level of suspicion for dysphagia and aspiration in the critically ill neonatal population.