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Use of 2.0-mm endotracheal tubes for periviable infants

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TO THE EDITOR:

The provision of intensive care for infants born at periviable gestations substantially increased in the past decade. In 2019, more than 500 infants born alive at 22 weeks' gestation at US hospitals in the Vermont Oxford Network received active treatment (58% of all liveborn infants)—more than twice the number who received intensive care in 2014 [1]. Despite this, appropriately sized equipment for such small patients may not be available at many US hospitals. In a recent survey of US neonatologists, 55% of respondents indicated that their hospitals did not stock 2.0-mm internal diameter endotracheal tubes (ETTs). The authors posited that the inability to use 2.0-mm ETTs may "impact decisions and outcomes" for periviable births [2].

Berger et al. recently described the use of 2.0-mm ETTs to provide initial invasive ventilation to 69 infants born weighing <750 g—one of few reports on 2.0-mm ETTs, and, to our knowledge, the largest to date [3]. The authors reported that 53 (77%) infants initially ventilated with a 2.0-mm ETT survived. They also showed no difference in ventilator

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AUTHOR CONTRIBUTIONS

MR drafted the initial manuscript and subsequent revisions. Data were collected by members of the Tiny Baby Collaborative, including TN, KM, and JA. PM and CB reviewed and revised the manuscript. All authors approved the final version of the manuscript.

COMPETING INTERESTS

The authors declare no competing interests.

days, ETT malfunction, or pCO_2 achieved compared to 2.5-mm ETTs. All infants received high-frequency jet ventilation, the first-line ventilation strategy at the University of Iowa during the study period [4].

Elaborating on these results, we wish to clarify that 2.0-mm internal diameter ETTs can successfully be used with other invasive ventilation modalities, as regularly performed at several of our institutions.

At the University of Uppsala from 2015 to 2019, 70 infants born at 22–23 weeks' gestation were initially ventilated with a 2.0-mm ETT; of these, 44 (63%) survived. All infants were managed with synchronized intermittent volume-targeted mechanical ventilation (Stephanie or Sophie Ventilator; Fritz Stephan GmbH, Germany) [5]. At Nagano Children's Hospital, from 2016 to 2021, 20 infants from 22 to 29 weeks' gestation were initially ventilated with 2.0-mm ETTs; 15 (75%) survived. At the University of Cologne, from 2019 to 2020, where the first-line approach to ventilatory support is to use non-invasive ventilation with less-invasive surfactant administration [6], 10 infants <500 g required intubation with 2.0-mm ETTs, of whom 8 (80%) survived. Both centers used high-frequency pressure-control or volume-guarantee ventilation (Draeger Babylog VN500, Draeger Medical, Germany) for these patients.

Citing data from the 1960s and 1970s (summarized here [7]), an early advisory statement by the International Liason Committee on Resuscitation noted an "unresolved controversy" regarding 2.0-mm ETTs: "Proponents argued that the small tube might be lifesaving in the case of extreme prematurity. However, concerns for increased airway resistance (inversely proportional to the fourth power of the internal radius) were raised." [8] The 8th edition of the Neonatal Resuscitation Program, published in July 2021, does not list 2.0-mm ETTs in its example list of neonatal resuscitation supplies and equipment [9].

Our collective experience empirically demonstrates the successful provision of invasive respiratory support via 2.0-mm ETTs to >100 surviving neonates using various respiratory modalities. For infants too small for larger diameter ETTs, the availability of 2.0-mm ETTs in the delivery room may be lifesaving.

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