

# Sudden unexpected postnatal collapse of healthy newborn infant after skin to skin contact: Neuropathological study

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Skin-to-skin contact (SSC), also known as Kangaroo Care, consisting in putting a newborn baby on the mother's chest right after birth, has been recommended by many American Associations as a care for both healthy term and preterm newborns, given its numerous positive effects on infants, as stability of heart-beat and breathing. In addition, in a meta-analysis, Boundy et al.<sup>1</sup> have demonstrated that, when compared with conventional procedures, SSC is associated with decreased mortality among newborns and provided support for a widespread implementation of this practice as standard care for newborns.

However, we intend to warn about the use of this practice as a panacea. Here we briefly have intended to discuss a case of sudden collapse which occurred in a newborn during SSC who unexpectedly died without previous warning signs seven hours after birth. The infant, a female, after a normal pregnancy appeared well developed with a weight of 3020, a length of 48 cm and head circumference of 35 cm. Any pathological finding was not detected in all organs at routine autopsy. However, the in-depth anatomopathological examination of the nervous system, and particularly of the brainstem, where the main structures that control the vital functions are located, following specific guidelines provided by the Italian law 31/2006<sup>2,3</sup>, revealed the presence of hypoplasia of the Kölliker-Fuse nucleus. The diagno-

sis of "hypoplasia" (or delayed development) of this nucleus, was made by comparing its cytoarchitecture with that of the same nucleus observed in a large series of age-matched cases, namely "controls", previously collected, in which autopsy examinations revealed the precise cause of death. The Kölliker-Fuse nucleus consists of a small group of neurons in the rostral pons that have an important function during intrauterine life, inhibiting any respiratory reflex, allowing only, at intervals, the occasional breathing activity essential for the lung development. At birth, its function changes drastically, becoming the main respiratory center, able to promote the first and the subsequent inspirations, and, at the same time, to coordinate the pulmonary motor responses to hematic oscillations of pO<sub>2</sub>, pCO<sub>2</sub> and pH<sup>4,5</sup>.

Then, in this case, the defective development of the Kölliker-Fuse nucleus, already in itself able to hinder normal breathing, has been exacerbated by the SSC position, with the baby face pressed against the mother's chest, so reducing the amount of oxygen supplied to the brain and, consequently, leading to a sudden unexpected postnatal collapse (SUPC).

In an extensive review of the literature<sup>6</sup>, Herlenius and Kuhun<sup>6</sup>, have reported variable rates of SUPC which occurred during SSC, attributing the death to the prone position (face down) of baby, something

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that pediatricians have universally deprecated since 1994. However, in none of the 400 well-documented SUPC cases included in this review a deep examination of the nervous system has been made.

The please insert a space herein underlines the need to do an in-depth examination of the central nervous system in victims of sudden neonatal death, particularly when associated with the SSC practice. The SSC must therefore be considered as a new risk factor for sudden postnatal collapse, to be added to others already well known, as maternal cigarette smoking, and even less known as pesticides and in particular the endocrine disrupting compounds (EDCs), recently highlighted<sup>7-9</sup>.

When the SSC is applied to babies with hypodevelopment of the Kölliker-Fuse nucleus, the cumulative negative effects of these factors greatly reduce the chances of survival.

In conclusion, since the initial 24 hours are indicated as the most critical for life, it is imperative to provide to the medical and nursing personnel, as well as mothers, accurate information regarding SSC that includes the risk of collapse, much more likely in the presence of some cerebral vulnerability, and to establish appropriate monitoring strategies in order to decrease the incidence of SUPC.

**Keywords:** collapse, newborn, brainstem, neuropathology

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