

Sixty-year anniversary of the Apgar scoring system and 100-year anniversary of the “Moro” reflex

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Abstract

It is well known that the names of discoverers are commonly used in medical terminology, especially in everyday use. The advantage of an eponym is that a complex description of a certain syndrome, surgical procedure, manifestations of a particular disease, or its details, can be expressed in a single word (Holomáňová & Brucknerová 2003). Current official anatomical nomenclatures do not use eponyms. Some exceptions do however exist. In pediatrics, we frequently use the names of two famous persons: Virginia Apgar and Ernst Moro.

INTRODUCTION

The complete investigation of a patient consists of physical, laboratory and additional specific investigations. Each step in investigation is of great importance. All over the process, results obtained from each part of the investigation have to be synthesized.

Physical investigation of the youngest child, particularly a newborn, is very important not only for the description of the current status of the baby but it can have a predictive value for its future development. The method and the investigation must be not only easy, simple and informative, but used worldwide and uniform for all neonatologists. A special situation, which can totally change the whole future life of the newborn, is asphyxia. The most sensitive organ to pre-, peri-, and postnatal asphyxia is the central nervous system (Brucknerová & Benedeková 2000).

This year is the anniversary of two very important methods of investigation used worldwide physicians introduced by Virginia Apgar and Ernst Moro.

VIRGINIA APGAR (1909–1974)

She was born in Westfield in New Jersey on June 7, 1909 (Figure 1). She completed her studies at Westfield High School in 1925, Mount Holyoke College in 1929. After 4 years she graduated from Columbia University College of Physicians and Surgeons. Later on she was focused on anesthesia, clinical and research work.

She was the first woman who became a full professor at Columbia University, College of Physicians and Surgeons, USA. In 1952 she presented the well known “Apgar” scoring test. Her activities concerned also the field of rubella, detection of antibodies in the process of iso-immunization (incompatibility in ABO and Rh factor between mother and fetus). She was highly productive all over her life. As a neonatologist she wanted to increase the interest not only in term but also in premature newborns. She worked in the field of anesthesiology and teratology. She received many honors and awards for her work. During her life



Fig. 1. Virginia Apgar (1909–1974) (source: <http://google.sk/imgres?q=virginia+apgar&um=1&hl=sk&biw>).



Fig. 2. Ernst Moro (1874–1951) (source: <http://google.sk/search?q=moro+ernst&um>).

she took part in the delivery of more than 17 000 newborns. She died in New York on August 7, 1974.

The Apgar scoring system was officially presented in 1952. It is a simple method of investigation of the newborn during the first, fifth and tenth minute of life. The Apgar score evaluates five basic signs: color of skin (Appearance), heart rate (Pulse), irritability (Grimace), muscle tonus (Activity) and breathing activity (Respiration). Each sign can obtain maximum 2 points, thus the total sum of points is 10. A healthy, vital newborn in optimal condition and response to the new surrounding will obtain 10 points each in the 1st, 5th, and 10th minute. When the sum is lower than 7 points, the newborn is asphyxiated and needs prompt resuscitation.

ERNST MORO (1874–1951)

He was born in Slovenia in Ljubljana on December 8, 1874 (Figure 2). He studied medicine in Austria, in Graz. In Munich he habilitated in pediatrics (1906) and became professor of pediatrics at the University of Heidelberg (1911). He died in 1951.

His name is associated with the so-called Moro's reflex, which is one of the very important and typical reflexes in newborns up to their 4th or 5th month of life. During his life he had the opportunity to cooperate with Theodor Escherich (1857–1911), the discoverer of *Escherichia coli*.

Moro's reflex belongs to the group of basic reflexes, which are typically presented during the first 5 months of life. It is a startle reflex, produced by a sudden stimu-

lus. It has three phases. The first phase involves spreading of arms (abduction) and in the second phase the arms are brought together (adduction). The last part of this reflex can be accompanied by crying. The principle of this reflex is the reaction of the newborn to sudden loss of support. In the case of premature newborns, its presentation can be incomplete. The complete form is present after 34 weeks of gestation. In differential diagnosis, in the case of incomplete or absent Moro's reflex, birth trauma is to be excluded (injury of brachial plexus, fracture of clavicle, etc.). The physiological duration of Moro's reflex is till the end of 5 months of life. If it remains present, severe neurological damage is to be suspected.

CONCLUSION

During the physical investigation of the newborn, the examiner's senses, sight, touch, and hearing, play crucial roles. The method of observation provides much important information. Sometimes simple approaches can be rather valuable. The newborn is not able to answer our questions, yet it is able to react to various kinds of stimuli. The physician, who is able to understand the newborn's language, is able to make the diagnosis. We can change the intensity of our speech or the intensity of our touch and we will obtain different "answers".

For the last 60 years the simple method of assessing the health condition of the newborn immediately after birth, i.e. the **Apgar scoring system**, has been used all

over the world. By using this method, we can classify the newborn as vital or asphyxiated (Brucknerová *et al.* 2005; Brucknerová 2009). It can be objected that it is only a subjective method, but on the other hand, biochemical investigation of blood immediately after birth is not available everywhere (Mondal *et al.* 2010; Tariqul *et al.* 2010; Yahyaoui *et al.* 2011). Virginia Apgar succeeded in joining not only theory with practice but also knowledge of pediatric anesthesiology with the specific postnatal adaptation of the newborn.

The synthesis of findings of the continual observation of the baby till the age of 5 months led to the description of **Moro's reflex** (Behrman *et al.* 1996). Without specific equipment, only by using our senses, mainly our sight and hands, we are able to identify the adequate response to a sudden loss of support. Moro's reflex with its three phases (abduction of the arms, adduction of the arms and crying) provides information about the condition of the central nervous system and its ability to react appropriately. The absence of Moro's reflex during the first 5 months of life (except hemiplegia, brachial plexus palsy, fracture of femur or clavicle) as well as the persistence of Moro's reflex after the 5th month of age is pathological.

We do not know the exact time of description of this reflex, yet it may be about 100 years old. Though this reflex is "old", it is still young. Even nowadays students must know how to elicit and how to evaluate the reflex.

Thank you, Professor Apgar.

Thank you, Professor Moro.

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