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LESSONS FROM THE MUSEUM

Infanticide from intentional choking: the use of evaluating older cases

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The Belgrade Higher School, the *Grande École*, was established in 1808, and was succeed by the Belgrade Lyceum in 1836 and then by the Great School in 1863. The school was a combination of a classical gymnasium and a college and as such, it eventually became the University of Belgrade in 1905. Officially, the University Medical School itself was established in 1920 [1]. The Institute of Forensic Medicine and Department for Forensic Pathology, as sections of the University Medical School, were officially founded in 1923 by Professor Milovan Milovanović (1884–1948) [2].

The following cases demonstrate that the best way to learn something new from older forensic cases is to link the autopsy report with an actual museum specimen or photograph.

Case outline 1

Museum reference

Museum specimen M No. 239 is a jar (Fig. 1a) containing a bundle of linen (Fig. 1b), attached to which is a label with the following text: "L No. 1465, M No. 239, Obturatio oris cum corpore alienae, December 8th 1926."

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Case history

By virtue of the clear "L No" and date on the label, the case has been readily identified in the records for the year 1926: "… Date of Autopsy: December 8th. A female infant was found under a bridge near an electric power station. Date of Death: Unknown. Forensic Case No: 281 …."

The body of the newborn was found in the proximity of the steam power plant "Power and Light," built in 1893 and located near the old Danube river harbor, in an impoverished section of the Dorćol quarter of the city of Belgrade. Between 1925 and 1927 this power plant was renovated and there was a temporary bridge under which the body of the infant was found.

Autopsy findings

The autopsy report was hand-written by Prof. Milovanović and read as follows; "… External Findings: Female infant … Length of the body 40 cm … The shape of the head is irregular, the posterior section less developed … The conjunctives are swollen, reddened, and hyperemic, possessing numerous pin-point hemorrhages … There are two linear superficial longitudinal excoriations present on the right side of the neck … The skin of the laryngeal region has numerous confluent bruises … The length of the umbilical cord is 62 cm and is pale, moist, and cut at the end … In its mouth is bundle of linen in the shape of a nut … Internal Findings: … There is a collection of blood in the subdural cavity and in the brain ventricles … A longitudinal bruise of the tongue mucosa, as well as numerous bruises of the laryngeal and the pharyngeal mucosa, are present. There are numerous bruises of the neck muscles and the neck subcutaneous tissue. There is a firm bundle of linen, which is obstructing the back of the mouth as well as

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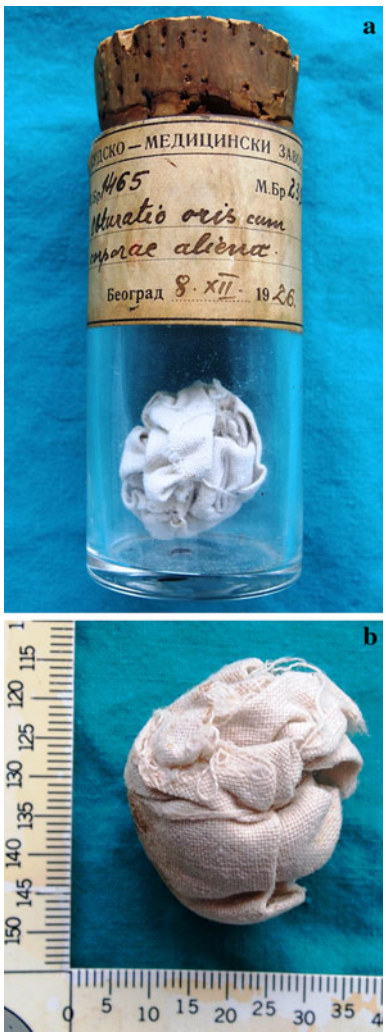


Fig. 1 **a** Museum specimen M No. 239, forensic case No. 281 from 1926: jar containing the bundle of linen removed from the mouth of the newborn during autopsy. **b** Close up of the bundle of linen

in the upper section of the larynx and the lower section of the pharynx … The visceral pleura are pink, shiny in appearance, smooth, possessing a clearly visible aerated texture and tiny pin-point hemorrhages. The lungs are expanded … the medial lung edges overlap the pericardial sac … The lungs are spongy and bright red … The whole pluck of the thoracic organs float in water … The stomach is inflated, floating in water … Dark green meconium is present …" (Fig. 2).

Cause of death

"I. The newborn, of 8 months' gestational age, is a premature infant that would have had the potential ability to survive after birth. II. The premature newborn was born alive and lived for only a short time after its birth due to dying as a result of throttling and pharyngo-laryngeal choking by a bundle of linen."

Case outline 2

Photograph: S587/57

Photographs have routinely been taken at the Institute during each forensic autopsy since the early 1950s. Hence, for forensic case No. 587 from the year 1957 there is a black-and-white photograph of an infant with an open mouth, containing a visible bundle of linen (Fig. 3).

Case history

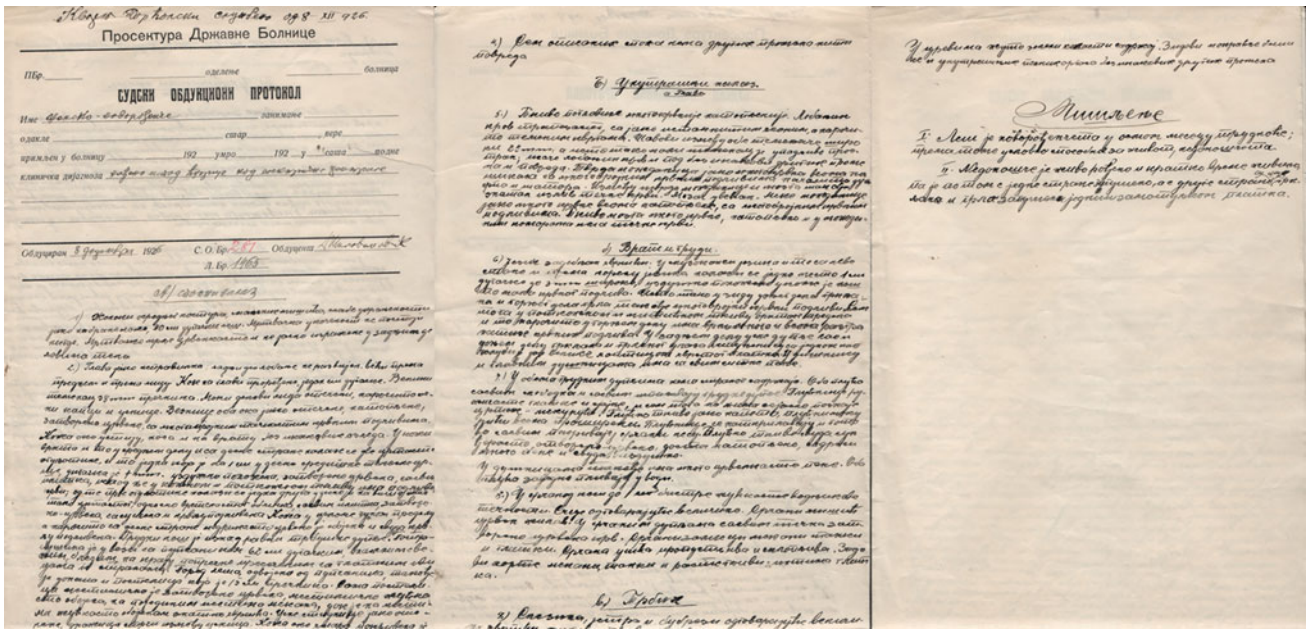
This case has been identified in the 1957 records: "Date of admission November 3rd … The body was found on a floor, rolled in rags …." The body was found in the city's industrial area.

Autopsy findings

The autopsy was performed by Prof. Djordjević and is typed: "… Date of Autopsy: November 3rd 1957 … External findings: Female infant, length of the body 50 cm, weight 2,950 g … The conjunctives reddened, hyperemic, with pin-point hemorrhages … A thread was protruding from the mouth, and, when the mouth was opened, a bundle of linen was visible … The skin of the armpits and the groin was covered with vernix caseosa. The length of the umbilical cord was 37 cm, cut at the end … Internal Findings: … There is swelling of the scalp in the right parietal region … There is a bundle of linen … completely obstructing the mouth as well as in the larynx and pharynx … The tongue mucosa has bruises … The pharyngeal and laryngeal mucosa, as well as the mucosa of the epiglottis, is slightly swollen, hyperemic, and has patchy bruises … The lungs are inflated, possessing rounded edges, while the visceral pleura are smooth, and have tiny hemorrhages. The whole pluck of the thoracic organs, each lung, each lung lobe, as well as all the lung pieces, float in cold water … The stomach and abdominal organs also float in cold water … Dark green meconium was found in the colon … An ossification center of approximately 5 mm in diameter is located in the lower part of femur …" (Fig. 4).

Cause of death

"I. This female newborn of 10 months' gestational age was a mature infant who would have had the ability to survive after birth. II. According to the lung- and stomach-floating tests, as well as the anatomical appearance of these organs, the infant was able to breathe and swallow air. III. The death was violent in manner, caused by pharyngo-laryngeal choking by a bundle of linen. IV. The death is homicidal in nature."


Просектура Државне Болнице

СУДСКИ ОБДУКЦИОНИ ПРОТОКОЛ

Fig. 2 The original autopsy report for the forensic case No. 281 from 1926

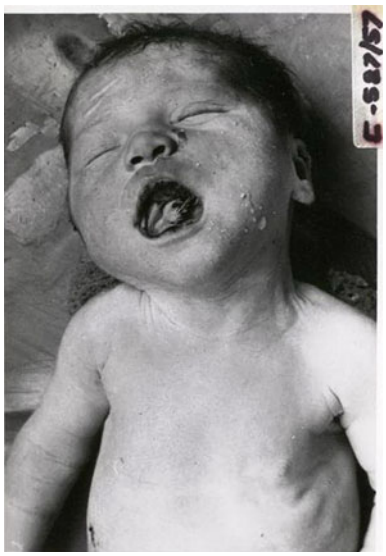


Fig. 3 *Black* and *white* photograph taken during autopsy, forensic case No. 587 from 1957

Discussion

Legal definitions of infanticide vary among different countries, but the medical concept of infanticide is uniform: the deliberate killing of a newborn infant by its mother [3].

According to article 30 of the First Criminal Code of Serbia which was proclaimed by Prince Karadjordje in 1807, "… an unmarried girl or women who gives birth to a bastard, is not to strangle her child, but rather nourish it freely … If she finds it shameful, she is to leave the child near the road or somewhere else where people do frequently pass, so one may collect the child and nourish it in her stead … But if she dare strangle her child, she will be condemned to death, without any mercy, because she has killed a person …" [4]. While it has undergone a series of changes, this article has remained as a part of active legal documents since 1807, including the Criminal Code of the Principality of Serbia of 1860, the Criminal Code of the Kingdom of the Serbs, Croats, and Slovenians from 1929, and further Criminal Codes which were proclaimed during the Socialist regime after the Second World War. According to article 116 of the currently enforced Criminal Code of the Republic of Serbia "a mother who causes death of her child at childbirth or immediately after delivery, while she is in state of mental disorder caused by delivery, shall be punished by imprisonment …."

This inclusion of article 30 in the contemporary criminal code led Prof. Milovanović to record in his textbooks published during 1920–1930s [5, 6] that a pathologist must ask and answer six questions through autopsy of an infant:

1. Is the child a newborn?

While neonaticide is the deliberate killing of a child within 24 h of its birth or in the first 30 days of its life [3, 7, 8], Prof. Milovanović regarded neonaticide to be the killing of a child "at childbirth or immediately after delivery," meaning within a defined period while the child is still a newborn; i.e. while at least one external or internal sign of being newborn is still present and visible on the body of the infant at the time of autopsy.

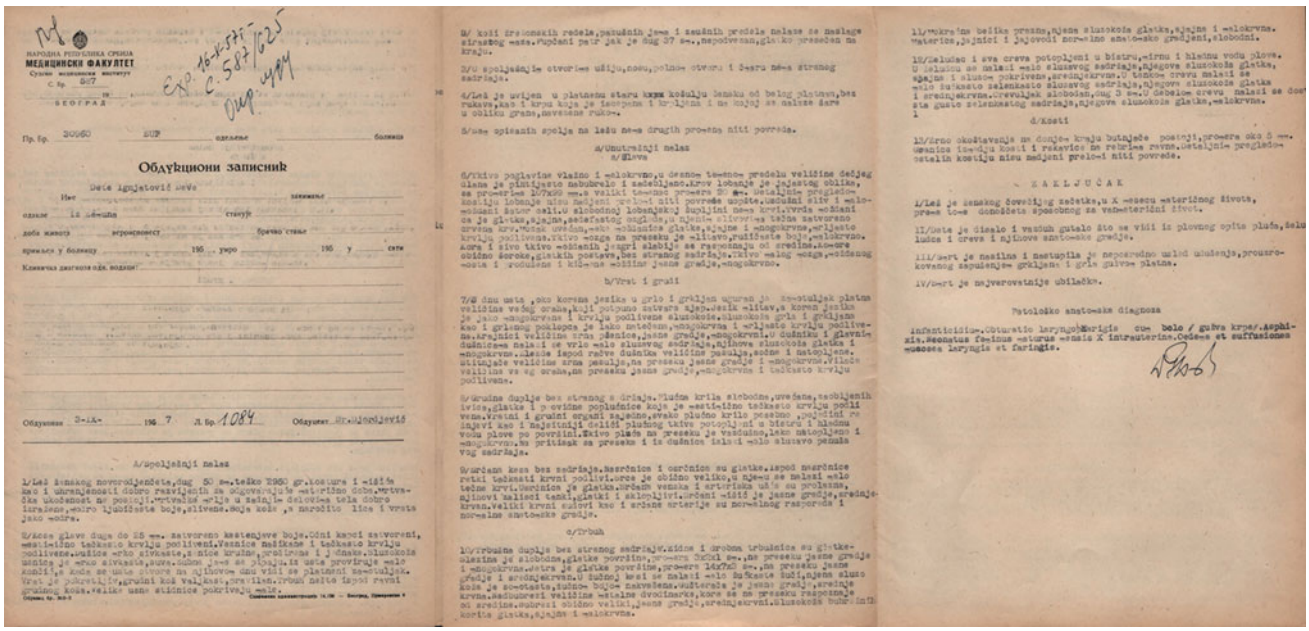


Fig. 4 The original autopsy report for the forensic case No. 587 from 1957

2. What was the gestational age?

This question necessitates estimating the age of the infant. If it were shown to be significantly premature, the assumption would be that it would not live long after birth without due medical attention [3]. Numerous physical characteristics that are useful in estimating of gestational age of newborns are discussed by Prof. Milovanović in his textbooks. The age is most reliably determined by comparing characteristics of an infant to standard growth charts [9].

3. What was the viability or potential ability of the newborn to survive after birth?

According to Prof. Milovanović, to be able to survive after birth it is not merely enough for a newborn to be mature (to be born after 28–30 weeks' gestation), they must also be sufficiently physically developed. Therein, the body weight of a newborn must be at least 1,500 g and a newborn should not be found to be small for dates. Furthermore, a newborn must be physically healthy, not suffering from congenital diseases, or congenital physical abnormalities.

4. Was the infant born alive?

Prof. Milovanović recommended a floating test to be carried out on all organs of the neck and chest, *en bloc*, and then of each lung, and then of each lobe. More recently this method has also been recommended by Saukko and Knight [3]. Prof. Milovanović also endorsed carrying out a floating test on the complete gastrointestinal tract, *en bloc*. He emphasized the significance of the macroscopic appearance of the lungs, as well as the possibility of a false positive floating test of the lungs in cases of hypothermia or of aspiration in which the amniotic fluid contained vernix. In Germany, the lung floating test is considered to be obligatory in forensic autopsies [10–12], but not still deemed necessary in Anglo-Saxon countries [3, 13].

5. How long had the infant been alive?

To estimate this Prof. Milovanović used the floating test of the gastrointestinal tract: it was considered that if the stomach floated the infant had been alive for at least 3–15 min.

6. What was the cause of death in the newborn?

According to Prof. Milovanović, a newborn's death could be the result of natural or violent causes (due to any act of omission or commission).

Asphyxia is the most common cause of neonaticide associated death [8, 10]. However, neonaticide by choking, while described in older reports, is less common in modern times [3]. The level of obstruction depends on the dimensions of the foreign body and its relation to the infant's airway size; for this reason, epiglottic, laryngeal, pharyngeal, and tongue mucosal congestion, as well as hemorrhage and petechiae are described in such cases [14]. The mouth, palate, and pharynx of an infant should be carefully examined for injuries as the foreign body is often removed by the assailant after death [15]. Prof. Milovanović underscored in his text-books that in cases of choking that

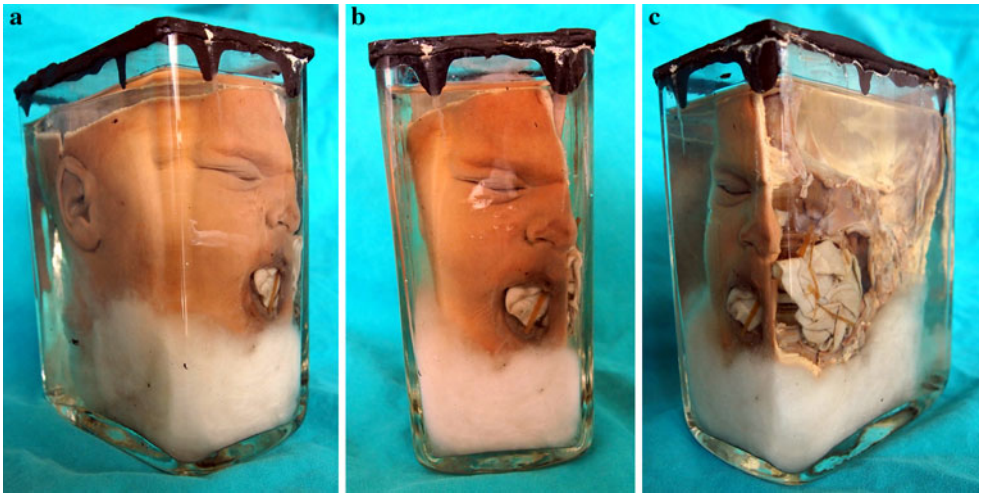


Fig. 5 Unlabeled museum specimen: sagittal section of an infant's head with a bundle of linen in its mouth. **a** *Right* side of the specimen. **b** Frontal aspect of the specimen. **c** *Left* side of the specimen

originate from the forceful insertion of a foreign body such findings are as important as finding the foreign body during an autopsy.

Another interesting specimen that can be found in the Institute's museum collection is an infant head, fixed in formalin, cut in a sagittal plane, with a bundle of linen placed in its mouth (Fig. 5). Unfortunately this has no identifying marks or labels. On the left side of this infant head, the position of the inserted bundle of linen is easily seen, as is the manner in which the obstruction of mouth and pharynx acts as a barrier for the airway (Fig. 6).

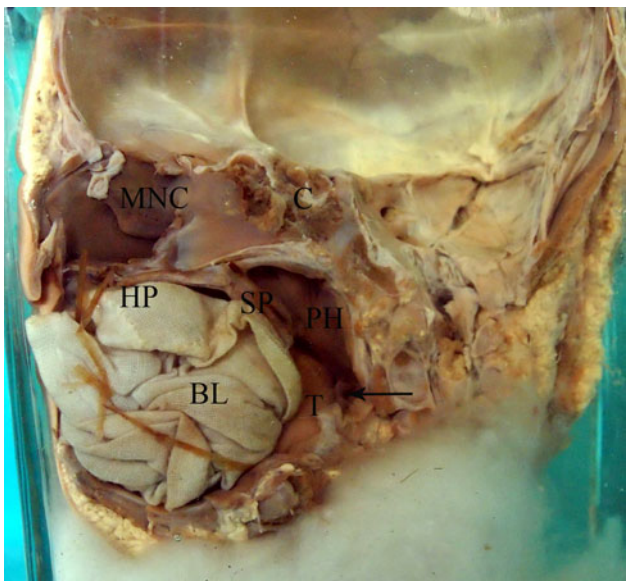


Fig. 6 *Left* side of the unlabeled museum specimen: sagittal section of an infant head with the bundle of linen. *MNC* middle nasal concha, *HD* hard palate, *SP* soft palate, *PH* pharynx, *C* corpus ossis sphenoidalis, *T* tongue, *BL* bundle of linen, *arrow* epiglottis

Postscriptum

A dead body is only one of the pieces in a greater puzzle, the autopsy of which identifies only the initial imprints of the origins of its death. Forensic predecessors did not know all of the pathophysiological mechanisms which lead to certain changes of organs and tissues, but they did notice them and often incorporated them into autopsy reports and textbooks. Today, these findings could be re-evaluated and be useful in the development of new scientific theories. It is our conclusion therefore, that older text-books should be read and reviewed more frequently, as it would seem that observations that may appear new may have already been described, just waiting to be seen again.

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References

1. Veljković S. Hronika Medicinskog fakulteta u Beogradu 1920–2010. Beograd: CIBIF Medicinski fakultet u Beogradu; 2010.
2. Veljković S. Hronika sudske medicine u Beogradu. Beograd: CIBIF Medicinski fakultet u Beogradu; 2009.
3. Saukko P, Knight B. Knight's forensic pathology. 3rd ed. London: Arnold; 2008.
4. Veljković S. Asfiktične smrti. Beograd: CIBIF Medicinski fakultet u Beogradu; 1999.
5. Milovanović M. Obdukciona tehnika. Beograd: Naučna knjižara Scientia; 1922.
6. Milovanović M. Sudka medicina—drugi deo. 2nd ed. Beograd: Naučna knjižara Scientia; 1933.
7. Di Maio VJ, Di Maio D. Forensic pathology. 2nd ed. Boca Raton: CRC Press; 2001.
8. Spitz WU. Spitz and Fisher's medicolegal investigation of death: guidelines for the application of pathology to crime investigation. 4th ed. Springfield: Charles C. Thomas; 2006.

9. Byard RW. Medicolegal problems with neonaticide. In: Tsokos M, editor. Forensic pathology reviews, vol. I. Totowa: Humana Press; 2004. p. 171–85.
10. Byard RW. Sudden death in the young. 3rd ed. Cambridge: Cambridge University Press; 2010.
11. Guddat SS, Gapert R, Tsokos M, Oesterhelweg L. Proof of live birth using postmortem multislice computed tomography (pmMSCT) in cases of suspected neonaticide: advantages of diagnostic imaging compared to conventional autopsy. Forensic Sci Med Pathol. 2013;9(1):3–12.
12. Rauch E, Madea B. Kindestoetung. In: Brinkmann B, Madea B, editors. Handbuch gerichtliche Medizin. Berlin: Springer; 2004. p. 921–38.
13. Grosse Ostendorf AL, Rothschild MA, Mueller AM, Banaschak S. Is the lung floating test a valuable tool or obsolete? A prospective autopsy study. Int J Legal Med. 2013;127(2):447–51.
14. Shkrum M, Ramsay D. Forensic pathology of trauma—common problems for the pathologist. Totowa: Humana Press; 2007.
15. Gordon I, Shapiro HA, Berson SD. Forensic medicine. 3rd ed. Edinburgh: Churchill Livingstone; 1988.