TECHNICAL NOTE

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Immersion Technique for Brain Removal in Perinatal Autopsies

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ABSTRACT: Perinatal autopsies present forensic pathologists with a variety of challenges, not the least of which involves the removal and examination of very small and sometimes fragile organs. Removal of the immature brain can be particularly troublesome. Even if great care is taken during brain removal, one is often left with no more than a semifluid amorphous mass of softened tissue by the time the brain is ready to be fixed in formalin.

We describe a method of perinatal brain removal which helps to preserve brain shape and integrity. By removing the brain while the head (and body) is totally immersed in water, we find that the brain is easier to remove and less apt to destruction. Subsequent fixation in formalin results in well-preserved, intact specimens, allowing for optimal examination and sectioning.

KEYWORDS: forensic science, autopsy technique, brain, perinatal death

Perinatal deaths (including fetal deaths after gestational age 20 weeks and neonatal deaths up to 28 days old) occur with an incidence of greater than 1% of births (1). Like many other autopsies, perinatal autopsies often provide valuable information (1,2). Depending on the circumstances surrounding death, as well as the various laws related to perinatal death investigation, medical examiners are often called upon to perform perinatal autopsies. Perinatal tissues are small, and often soft and fragile. Brain removal particularly can present a problem for pathologists, with specimens becoming badly damaged during removal prior to fixation. Pediatric pathology texts and journal articles describe a variety of methods which may be used to help maintain the integrity of the immature brain during removal at autopsy (3–5). One such method that involves immersing the head in water during brain removal is not widely recognized by forensic pathologists. We describe and illustrate a method of perinatal/neonatal brain removal which is performed while the head (and body) is totally immersed in water.

Materials and Methods

The materials required to perform this technique are readily available in most morgues. A relatively large sink filled with tap water is sufficient. Alternatively, a water-filled basin can be used. The only other materials required are non-electrical instruments for underwater skull reflection/removal and brain removal. Scissors, a scalpel, and a pair of forceps are sufficient.

The procedure itself is relatively simple. Essentially, after scalp reflection, the remainder of the brain removal, including skull reflection, is performed as usual, except that the child's head and body are immersed in the water. Figures 1 through 7 illustrate the procedure. Once the brain is free, it can be gently collected from the water into a pre-weighed container. After carefully draining the water from the container, the brain can be weighed prior to fixation.

Results and Discussion

This technique of brain removal can help the forensic pathologist better maintain the fragile brain tissue during performance of perinatal autopsies. The water acts to prevent the collapse of soft brain tissue, thereby preserving the integrity and shape of the brain. In addition, the brain is bouyant in water, decreasing the need for manual manipulation.

The immersion technique is easy to perform and inexpensive. Although not terribly time-consuming, the method does require more time and preparation than routine brain removal techniques. Therefore, it is probably not indicated in all perinatal autopsy cases, but only in select cases, for example, when the brain is extremely soft (macerated fetuses) or when recovery of an intact, well-preserved brain is of paramount importance. In fact, the technique could even be used in other non-perinatal infant and/or child autopsies when the brain is markedly softened.

Several special methods of perinatal brain removal have been described in the medical literature (3–5). Some of them (for example, percutaneously injecting fixative into the ventricles hours to days prior to brain removal [3,5]) are not practical for the forensic pathologist. The method described in this technical note has been previously described by pediatric pathologists, and various fluids other than tap water have been utilized (5). Although previously described, the immersion technique is not widely recognized or utilized by forensic pathologists. In select cases, we find that the method can be extremely valuable in maintaining the integrity of specimens prior to fixation so that subsequent examination is optimized.

Conclusion

A method for perinatal brain removal is described. By removing the brain while the head is immersed in water, the damage which

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FIG. 1—*Neonate's body underwater within a basin, after dissection of thorax and abdomen and scalp reflection.*

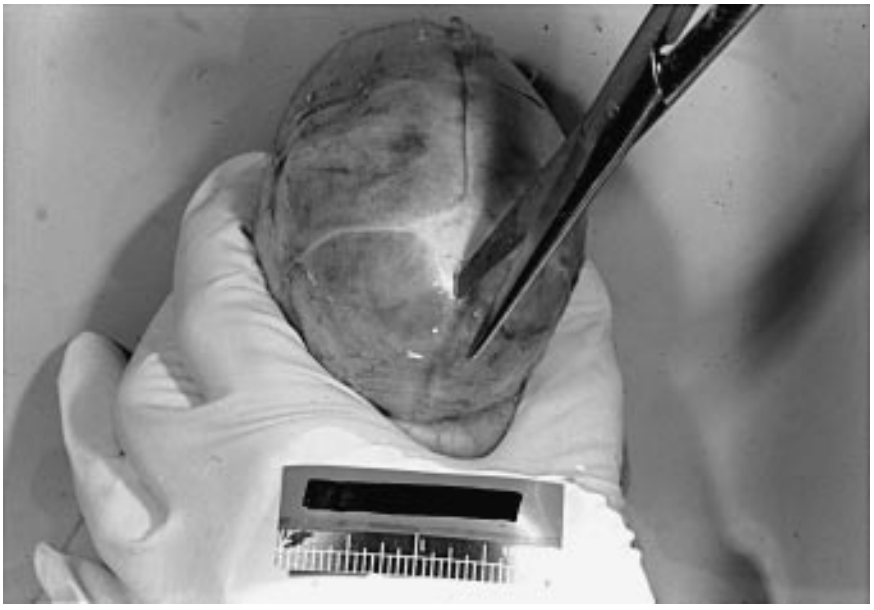

FIG. 2—*Initial incision through fontanel while head is immersed in water.*

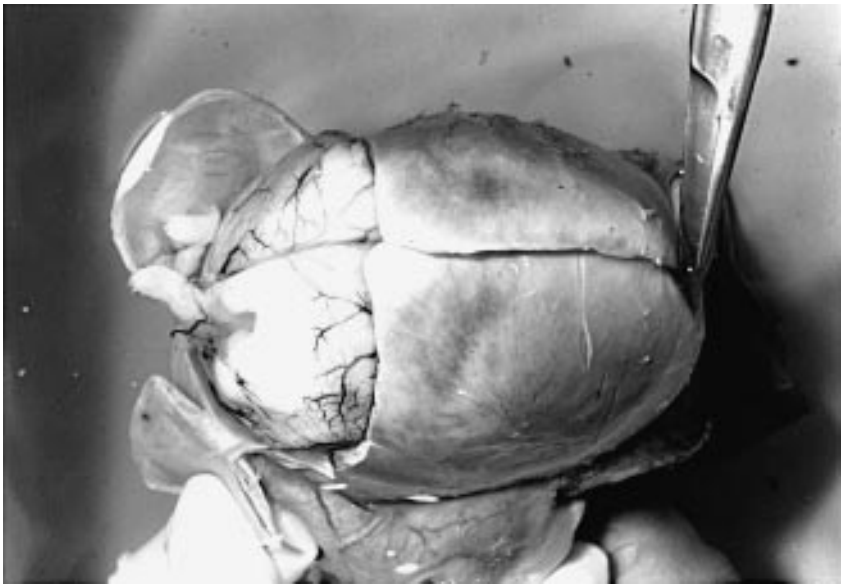

FIG. 3—*Underwater skull reflection.*

FIG. 4—*Underwater skull reflection continued.*

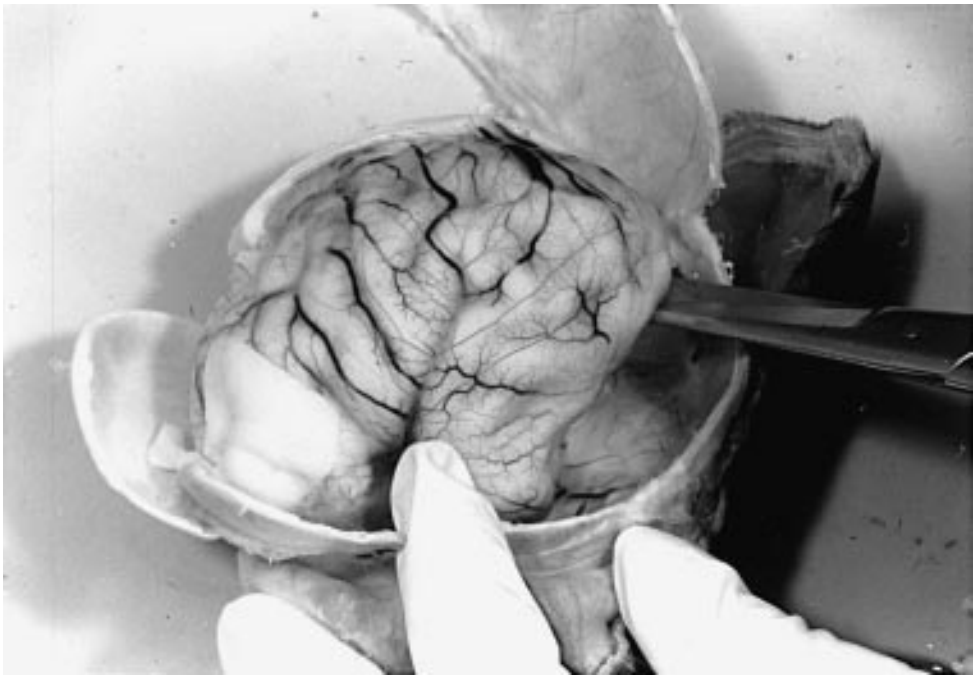

FIG. 5—*Dissection of brain from cranial cavity.*

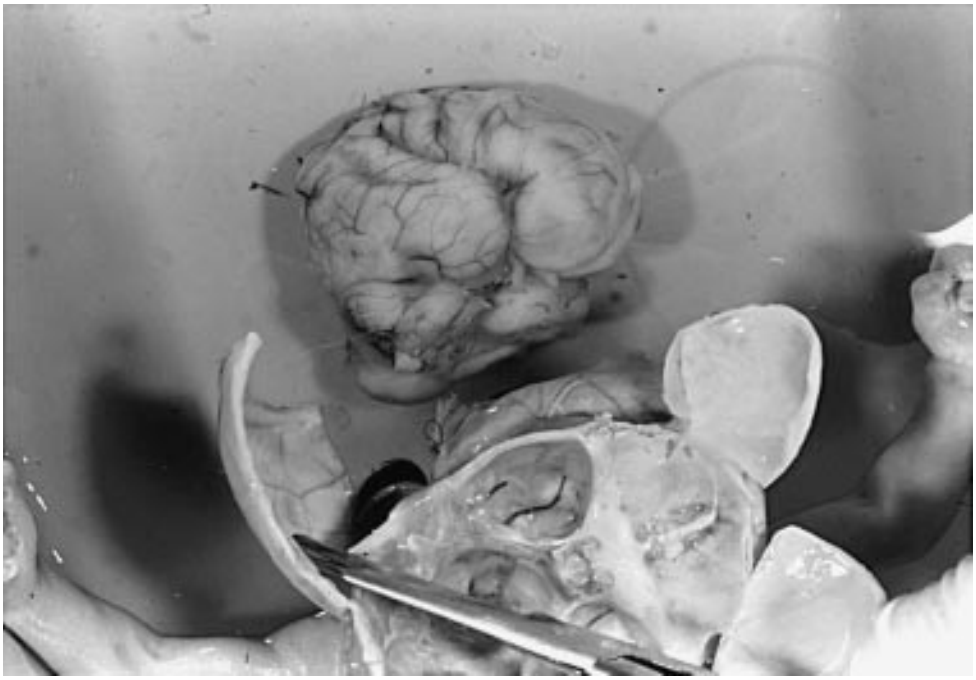

FIG. 6—*Submerged brain free from cranium.*

FIG. 7—*Intact brain, still immersed, prior to fixation.*

commonly occurs to such immature brains during routine brain removal is minimized, and the specimen's shape and integrity are better maintained. In select cases, the use of this method can result in well-preserved, intact specimens, allowing for optimal examination and sectioning.

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