Original Research Paper

Easy Confirmation of Drowning By Detection of Diatoms in Trachea

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Abstract

One of the ways adopted by a person for suicide is drowning. Criminals also hide their crime by throwing person in water after murder. To identify ante mortem drowning or post-mortem drowning, many postmortem findings are considered e.g. hairs and clothing found wet; washer woman's appearance in palm and sole; copious leathery froth from mouth and nostrils, etc. But these are not confirmatory and also not present in every case. As, froth also present in poisoning cases and hair and cloth may not be wet if body remains outside water after taking out from alleged place of drowning, therefore to overcome all these fallacies in ante-mortem drowning; presence of diatom in trachea can be considered as a confirmatory test. The conventional Diatom test from bone marrow also has many fallacies and false result. To overcome all these difficulties, the new method is proposed which is easy, less cumbersome, economical and confirmatory test of drowning.

Key Words: Drowning, Tracheal fluid, Diatom, Poisoning

Introduction:

Since long time, it is in practice that confirmation of drowning is done by diatom test from bone marrow of long bone. Tibia or femur, which used to taken out at the time of postmortem and handed over to police constable who brought them for examination after a long time or sometimes didn't turn up.

Bone marrow is taken out by the unskilled person where due to chances of contamination, false positive results will be more and if bone marrow is taken from such body, where the place of drowning is having less diatom or marrow is taken from place where diatom is not present, then false negative result will obtain. During post-mortem, bone is taken out resulting in disfigurement of body which hurt relatives. [1] To overcome all these difficulties, it has forced us to think that why we cannot take fluid from primary site i.e. trachea which causes asphyxia death in drowning for diatom test.

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Diatom:

Most natural water contain diatom, a class of microscopic unicellular algae suspended in water. They have silicon cell wall which resist acid digestion and putrefaction most spices occupy a size range 10 µ to 80 µ.

They live free or unite to form colonies drifting, either on the plankton or attached to mud, sand or any other solid substance.

Only the live body with a circulation can transport diatom from the lung to brain or bone marrow from where they may be detected microscopically after suitable treatment. Their presence in other viscera such as liver, etc. does not have much significance. [2, 3]

Material and Methods:

Material used: Sterile syringes, Test tubes, Centrifuge machine, Concentrated HNO_3 and HCI, Microscope, Pipette, Glycerin, Distilled Water, Lamp, Slides, Cover slip

Tracheal fluid from trachea has been taken in a sterile syringe at the time of postmortem and this fluid was mixed with equal amount of concentrated $HNO_3$and HCI and kept for 4 to 6 hours and heated till clear fluid is obtained. After that, this fluid is centrifuged for 2 minutes at 3000 revolutions/minute.

The sediment material washed with distilled water and washed sediment was used for preparation of diatom in clean slides and visualized under microscope. [3]

Precautions: Slides, cover slip and syringes should be clean properly with distilled water.

In all study cases (Table 1), bone was preserved but unfortunately, only one bone was brought to the department for exanination where Diatom test was found positive.

Result:

In present study, 17 cases were examined in the Medico-legal Institute, Bhopal during July 2012 to March 2014. All cases were positive except one case of a new born baby who was underweight (1.3 kg).

Hospitalized case might be thrown after death in water. Even in the decomposed bodies the results were 100% accurate. Water will not enter in trachea in decomposed body even after rigor mortis passed away as shown in photographs of autopsy case in which duration of death is 1-2 weeks since postmortem examination. (Fig. 5)

Other Signs of Drowning:

Clothing and hairs are generally found wet and washer women appearance exists on palm and sole. In drowning cases, white, copious, leathery and tenacious froth exist at nostril mouth and trachea which increases on compression of chest and squeezing of lungs.

Lungs are voluminous and cover the chest wall and impression of ribs are found. On dissection of lung, white froth with blood oozes out with crackling sound.

Discussion:

As trachea is devoid of anything except mucus therefore, even a single diatom algae mud particle is positive sign of drowning because it reflects that some outsource fluid or material containing diatom has entered the trachea. It is important to note that in some cases the number of diatom is very less or where fluid does not get the opportunity to enter in trachea like laryngospasm, fear etc. in such situations tracheal fluid may not demonstrate diatom.

In asphyxia death case, death occurs in very little time and it is not known how much time diatom will take to reach up to long bone because circulation of blood stops immediately after death. Results are also doubtful as location of bone marrow taken, for test may not contain diatom in conventional method.

As we know Diatoms have a strong silicon wall and stick to Trachea. It doesn't come out with froth which oozes after sometime because it is always white in color in spite of dirty or clear water which is free of dirt that means diatom remains in trachea and sucked in syringe by creating negative pressure.

Stomach water can't be taken for Diatom as it gives false positive result if person had drunk water just before murder and thrown in allege place of water from where body recover.

Conclusion:

The results are more accurate, chances of artifact are almost nil by this easy going method in comparison to conventional method. The method proposed as above will give a scientific conclusive and quick result by which we can extract a scientific conclusive opinion immediately. Deceased relatives will not be hurt and will not object due to any disfigurement of dead body.

For confirmation of drowning, above method should be adopted as the demerits of conventional method could be overcome by this proposed method.

References:

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Table 1: Observation Table

S. N.	Age (Yrs)	Duration of Death (Hrs, day & week)	Diatom In Tracheal Fluid
1	16	24 Hours	Positive
2	16	24	Positive
3	18	61	Positive
4	35	36	Positive
5	30	24	Positive
6	15	24	Positive
7	11	24	Positive
8	12	24	Positive
9	12	36	Positive
10	18	24	Positive
11	20	36	Positive
12	2 Days	24	Negative
13	13	24	Positive
14	25	3-5 Days	Positive
15	3 Months	24	Positive
16	Full Term	24	Positive
17	22	1-2 Weeks	Positive

Fig. 1: Pattern of Diatoms Slide

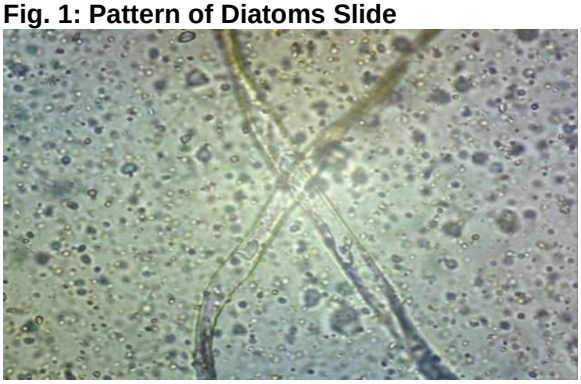

Fig. 2: Pattern of Diatoms Slide

Fig. 3: Pattern of Diatoms Slide

Fig. 4: Pattern of Diatoms Slide

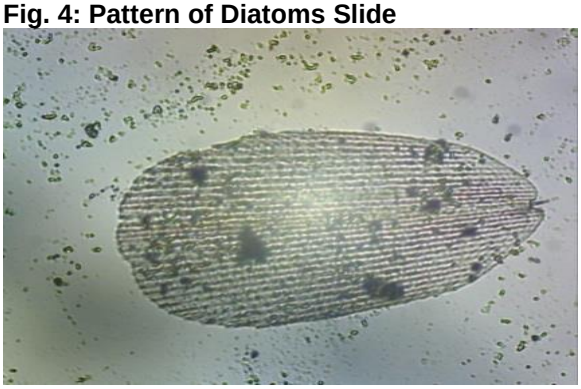

Fig. 5: water will not enter in trachea even after rigor mortis Passed off (Decomposition Changes 2 Weeks after Death)

5a: water will not enter in trachea even after rigor mortis Passed off (Decomposition Changes 2 Weeks after Death)