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The adequacy of tissue obtained by percutaneous needle autopsy in comparison to conventional autopsy for lung and liver tissues

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ABSTRACT

Background: Autopsies are done since the olden days to study anatomy, to learn pathology, and to identify the cause of death. However, this procedure is not widely accepted due to lack of facilities, reluctancies by relatives, various religious and ethical issues, and fear of transmission of communicable diseases. Percutaneous needle autopsies have bridged these shortcomings and provide better results when done under radiological guidance. **Aims and Objectives:** The aim of the study was to determine the adequacy of tissue obtained by percutaneous needle autopsy in comparison to conventional autopsy for lung and liver tissues. **Materials and Methods:** Descriptive study, done in autopsies performed in the Department of Forensic Medicine and Department of Pathology, Government Medical College Kottayam. Percutaneous needle samples are obtained from lungs and liver using surface landmarks. Samples are also obtained after opening the deceased body. After microscopic examination, adequacy is observed and morphological findings are compared. **Results:** In lungs, 164 samples met the adequacy criteria and 156 samples showed similar morphological findings by both methods; in the liver 159 samples met the adequacy criteria and 151 samples showed similar morphological findings by both methods. In lungs and liver, the most common histological finding was congestion. **Conclusion:** Percutaneous needle autopsies and the tissue thus obtained are adequate and comparable when compared to conventional autopsies. The findings are more comparable in diffuse lesions rather than in localized lesions.

Key words: Adequacy; Conventional autopsy; Necropsy; Percutaneous needle autopsy; Histomorphology

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INTRODUCTION

Autopsies are of great value due to its importance in helping out to reach the cause of death in many suspicious and natural deaths.[1,2] Conventional autopsies are the mainstay and gold standard in this procedure, but they are not widely accepted due to many reasons.

Percutaneous needle autopsies help to overcome many of the hurdles which limit the use of conventional autopsies which made needle autopsies to be accepted in practice aided by radiological modalities which can improve the sample collection.

In our study, we chose lung and liver tissues for comparison primarily because of the ease in accessibility of these organs from outside the body.

Aims and objectives

To determine the adequacy of needle autopsy in comparison to conventional autopsy for lung and liver tissues.

MATERIALS AND METHODS

A descriptive study was done on 188 autopsies. All autopsies done during the study period of 18 months in the adult population (above 18 years) were included except those

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cases where there were delays in post-mortem procedure, cases with burns, and decomposed bodies.

Using 11-size blade, a small nick is made over the sites proposed to take the biopsies. Using 16 G trucut biopsy needle, percutaneous samples are taken from lungs and liver using surface landmarks (liver - along the midclavicular line under the rib arch transabdominally, lung - both lungs at the level of 3rd intercostal space or from 6th to 7th intercostal space along the midaxillary line).[3] Multiple passes (a minimum of 10 passes) are made. The sample is also taken when the deceased is opened for conventional autopsy (from suspicious areas also if any present). Samples obtained through both methods are fixed in 10% formalin, processed, stained using eosin and hematoxylin, and examined and compared histopathologically. The adequacy is assessed by observing the following criteria:

Liver – Number of portal tracts (at least with 10 portal tracts and 1cm in length).[4] Cases which are inadequate but with significant pathological findings will be considered adequate.

Lungs – To obtain adequate samples, multiple passes are made covering a wider area of lung tissue. Since there are no definite adequacy criteria for trucut biopsies in lungs, in our study, at least 10 passes will be made from each lung to obtain enough samples for histopathological examination and comparison. A minimum number of 75 alveoli in each core is considered as adequate in our study (a pilot study was done to obtain the adequate number of alveoli). Samples which have significant pathological findings will also be considered as adequate samples.

Inclusion criteria

Adults in whom autopsies are done during the study period.

Exclusion criteria

Cases where delayed post-mortem is done, burns, decomposed bodies.

The tissues obtained are observed and compared to study the proportion of the samples with similar morphological findings by both methods and adequacy is also observed. The data obtained are entered using Microsoft Excel, analyzed using SPSS software.

RESULTS

In our study, samples from both lungs and liver were obtained from all 188 cases. In this study, the maximum number of cases were from the age group 50 to 59 (26.6%) followed by 60–69 (22.3%) with 156 males (82.98%) and 32 females (17.02%). Considering the adequacy of trucut samples, 164 samples (87%) from lungs and 159 samples (85%) from the liver were adequate. On comparing the histomorphological findings, 156 samples (83%) from lungs and 151 samples (80%) from the liver showed similar and comparable morphological findings. Histomorphological categories were categorized as normal, non-significant pathology, significant pathology, and lethal pathology. In our study, 153, 33, and two cases were categorized as non-significant, significant, and lethal pathology, respectively, in lungs and 4, 118, and 66 cases were categorized as normal, non-significant, and significant pathology, respectively, in liver. The most common histomorphological finding in lungs and liver is congestion (Tables 1 and 2). The findings which were missed in trucut biopsies are pneumonia and emphysema in lungs and early cirrhotic changes in the liver (Table 3). In our study, most of the deaths were due to road traffic accidents (34.6%) followed by hanging (23.9%).

DISCUSSION

Needle autopsy has many advantages when considering routine autopsy like the procedure can be done by a trained personnel, samples can be collected from almost all organs using surface landmarks, the risk of disease transmission is less, autolytic features are minimal, the procedure is less expensive, can be done immediately after death, samples can be submitted for frozen sections[5] and electron microscopy,[6] minimal or no disfigurement of the deceased. Documentations about needle autopsies are noted since 1955 (by Terry).[7] In the earlier days, necropsies/needle autopsies were done to detect HIV, cerebral malaria, and circumstances where the consent for a complete autopsy was not obtained.[8-10]

Even though the procedure is less cumbersome and feasible, its use is not widely accepted due to the inability to view the internal organs *in situ*, to obtain samples from small organs such as parathyroid, adrenals, and thymus, to obtain representative samples in cases with localized lesions in the organs.[11]

Guided needle autopsies have bridged the gap which was seen in blind biopsies and are being used as a part of virtual autopsy and minimally invasive autopsy.[12,13] Virtual autopsy can detect post-mortem changes and identify the cause of death and is also feasible to collect samples from suspicious/localized lesions.[12,14-16]

Guided autopsies can be done with the aid of ultrasonogram or computed tomography or magnetic resonance imaging[14,15,17-21] which can improve the success rates of obtaining representative samples.

Table 1: Histomorphological findings in lungs age groupwise

Age group	Cong	Edema	Hmg	Pigment	C/c infl	Emphy	Pneu
20–29	15	10	3	8	1	1	2
30–39	13	10	0	5	0	2	4
40–49	24	18	0	6	1	1	4
50–59	37	27	4	12	1	3	7
60–69	27	28	4	12	3	2	5
70–79	13	12	0	6	0	0	2
80–89	8	5	1	5	1	3	0

Cong: Congestion, Hmg: Hemorrhage, Pigment: Pigment-laden macrophages, C/c infl: Chronic inflammation, Emphy: emphysema, PNEU: Pneumonia

Table 2: Histomorphological findings in liver age groupwise

Age group	Normal	Cong	Chole	Fatty change	Sig Stea	Sh	Ec	Cir
20–29	1	5	1	5	1	3	4	3
30–39	0	5	1	5	3	4	6	1
40–49	1	11	1	8	4	5	6	3
50–59	0	15	3	18	4	7	7	5
60–69	0	15	1	14	4	5	8	2
70–79	0	5	8	2	2	3	1	0
80–89	0	8	1	2	0	1	2	0

Cong: Congestion, Chole: Cholestasis, Sig Stea: Significant steatosis, Sh: Steatohepatitis, Ec: Early cirrhosis, Cir: Cirrhosis

Table 3: Significant pathologies missed in trucut biopsies

Lung		Liver
Pneumonia	Emphysema	Early cirrhosis
11 (6%)	5 (3%)	8 (4%)

The needle used for this purpose has undergone several modifications starting from Iversen Roholm needle and Vim Silverman needle to semiautomatic needles to automatic biopsy guns.[7]

One hundred and fifty-six samples (83%) from lungs showed similar morphological findings in both trucut biopsy and conventional autopsies (Figure 1). In Foroudi et al.'s study, 38% of samples from lungs showed similar findings.[11] 151 samples (80%) from the liver showed similar morphological findings in both trucut and conventional autopsies (Figure 1). In Foroudi et al.'s study, 48% of samples from the liver showed similar findings.[11] In Huston et al.'s study needle sampling correlated with the complete autopsy in 87% of cases.[16] In West and Chomet's study, 48% of samples showed similarity (included samples from lung, liver, and kidney).[22]

In our study, more than one histological finding was observed in the majority of the cases for both lungs and liver. Non-neoplastic findings were obtained in our study.

In lungs, the most common finding was congestion (137 cases, 72.87%) followed by edema (110 cases, 58.5%). Khare et al.'s study showed congestion and edema to be the most common finding in lungs.[23] In Jagadish et al.'s study the majority of cases had congestion in 77.7% of cases and edemain 47.7% of cases.[24] In Pathak and Mangal study, 57.7% of cases showed congestion, 37.7% of cases showed edema and 24.4% showed pneumonia.[25] Terminal changes were seen which included pulmonary edema, emphysematous changes, congested blood vessels, and the presence of hemorrhage.[26] The most common artefacts encountered were bubble artifacts, hemorrhage, and artefactual collapse in trucut samples.

In liver, the most common finding was congestion, (34%) followed by fatty change (31.9%). Other findings are cholestasis (8%), significant steatosis (9.5%), steatohepatitis (11.1%), early cirrhosis (18.08%). These findings were seen in combinations with each other and also with other findings and are comparable with other studies. In Bhagat et al.'s study, the most common finding was steatosis 32.5%.[27] According to Patel et al., study, venous congestion of liver is terminal end stage of the death seen in most of the liver autopsies.[28] In Singh et al.'s study, most of the cases on histopathological examination showed sinusoidal and vascular congestion (20 cases, 43.5%).[29] In Alagarsamy et al.'s study, the majority of the cases had congestion 26%, followed by normal liver 22%, fatty changes 20%, cirrhosis 16%, and hepatitis 10%.[30]

Autolysis was observed in 2 (1%) cases in lungs and 14 (7%) cases in liver from trucut samples. Autolytic changes are minimal in trucut samples due to the small size and better fixation of the samples.

Number of bronchioles could not be considered in adequacy criteria since they were not seen in most of

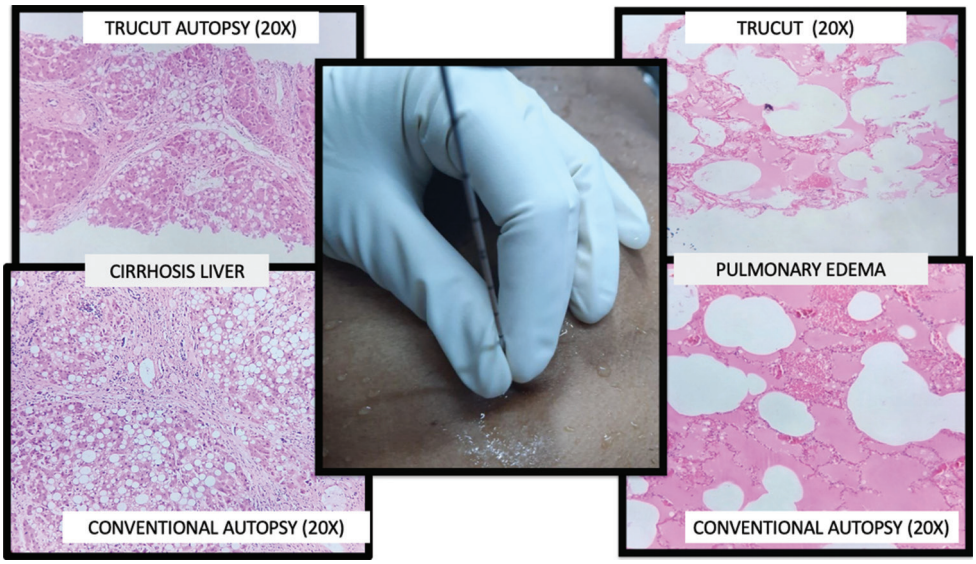

Figure 1: Trucut biopsy procedure and comparison between both the procedures in cases with cirrhosis and pulmonary edema with emphysematous changes

the biopsy samples. In our study, only 48 cases showed bronchioles in the trucut samples.

We concluded that percutaneous needle autopsies and the tissue obtained are adequate and comparable when compared to conventional autopsies; the findings are more comparable in diffuse lesions rather than in localized lesions and findings from lungs are more comparable than from liver in needle autopsies.

Limitations of the study

All the studied cases had only diffuse lesions predominantly and the lesions were non neoplastic. All the needle biopsies were done blindly without any radiological guidance. Hence localised lesions couldn't be sampled adequately.

CONCLUSION

We concluded that percutaneous needle autopsies and the tissue obtained are adequate and comparable when compared to conventional autopsies; the findings are more comparable in diffuse lesions rather than in localized lesions and findings from lungs are more comparable than from liver in needle autopsies.

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