

# Importance of Autopsy from a Gastrointestinal Pathology Perspective: A Ten-year Review of 891 Autopsies

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## Abstract

The major reason for the decline in autopsies in recent years is the ability to diagnose diseases and disorders that result in mortality with greater accuracy. With obesity being endemic in the United States, a greater understanding of the pathology underlying gastrointestinal/hepatobiliary/pancreatic (GIHBP) disorders plays a key role in understanding the cause of death in numerous cases. Despite the diagnostic evolution of medicine, autopsy findings still help us understand things that cannot be explained during surgical pathology reviews. Hence, we present a ten-year review of GIHBP findings from 891 autopsies.

A retrospective review of autopsies performed between January 1<sup>st</sup> 2009 and September 30<sup>th</sup> 2018 was done. Out of 891 autopsies, 415 cases were excluded since GIHBP findings were observed in 476 autopsies. The age range included 1 day to 117 years with a male predominance (480; 54%). The most common cause of death was cardiovascular/ pulmonary (264; 55.5%). The most common gastrointestinal (GI) findings in “GIHBP group” were bowel ischemia/necrosis/infection (32; 37.2%). The most common hepatobiliary/pancreatic (HBP) findings in “GIHBP group” were cirrhosis/end-stage liver disease (37; 43.0%). The most common GI findings in “other causes of death” were incidental findings such as diverticula, polyps, hypertropias, bile duct adenomas, gastrointestinal stromal tumors, neuroendocrine tumors, other mesenchymal tumors and hemangiomas. The most common HBP findings in “other causes of death” were incidental hepatic congestion/necrosis.

GIHBP pathology accounts for the second most common cause of death in our review. Fatty liver was two times more common amongst patients with non-GIHBP causes of death than those with GIHBP causes.

**Keywords:** Autopsy, Gastrointestinal, Hepatobiliary, Pancreatic, Ischemia, Infection, Incidental findings

## Introduction

There has been a decline in autopsy rates by 58% from 1972-2007 [1]. The major reason for this decline is the ability to diagnose diseases and disorders that result in mortality with greater accuracy [2]. Additionally, the Joint Commission on Accreditation of Healthcare Organizations dropped the standard practice of requiring a 20-25% autopsy rate for in-hospital deaths [1]. The perception or attitude towards autopsies from both family members and clinicians is changing leading to a further decrease in the autopsy numbers [3].

With obesity being endemic in the United States, a greater understanding of the pathology underlying gastrointestinal/

hepatobiliary/pancreatic (GIHBP) disorders plays a key role in understanding the cause of death in numerous cases. Despite the decline in the number of autopsies, it continues to be a valuable tool for evaluating and understanding the histopathology of disease. Coronavirus disease-19 (COVID-19) pandemic has further highlighted the importance of autopsy as a tool for understanding the pathophysiology of the disease with multiple publications highlighting gastrointestinal findings of COVID-19 at autopsy [4,5].

There have been many advances in diagnostic medicine so the field of GIHBP pathology is constantly evolving. Washington et al. reported pancreatic malignancies as one of the most common secondary tumors found in

the gastrointestinal tract at autopsy [6]. So despite the diagnostic and therapeutic evolution of medicine in general and GIHBP disorders in particular, autopsy findings still help us understand things that cannot be explained during surgical pathology reviews. Here we present a ten-year review of GIHBP findings from 891 autopsies.

## Materials and Methods

A retrospective study design was used to explore GIHBP findings at autopsy. Autopsies performed between January 1<sup>st</sup> 2009 and September 30<sup>th</sup> 2018 was reviewed retrospectively and GIHBP findings at autopsy were recorded. Data was reviewed for gross findings and slides were reviewed for histological findings. The causes of death were divided into GIHBP, cardiovascular/pulmonary, neuropathological, infectious, and malignant and others. The GIHBP findings in each case were recorded under the subcategories of malignancies, varices/hemorrhage, ischemia/necrosis/infarct/infection, diverticula/polyps/lipoma/ heterotropia/others, cirrhosis/end-stage liver disease, fatty liver (alcoholic/non-alcoholic), pancreatitis/hepatitis and incidental findings/others.

## Results

Out of 891 autopsies, 415 cases were excluded since GIHBP findings were observed in 476 autopsies. The age range included 1 day to 117 years with a male predominance (480; 54%). The most common cause of death was cardiovascular/ pulmonary (264; 55.5%). Eighty-six people died of GIHBP causes constituting 18.1% of the total deaths. The most common gastrointestinal (GI) findings in GIHBP causes of death group were bowel ischemia/necrosis/ infection (32; 37.2%). The most common hepatobiliary/ pancreatic (HBP) findings in GIHBP causes of death group were cirrhosis/end-stage liver disease (37; 43.0%). The most common GI findings in other causes of death group were incidental findings such as diverticula, polyps, hypertropias, bile duct adenomas, gastrointestinal stromal tumors, neuroendocrine tumors, other mesenchymal tumors and hemangiomas. The most common HBP findings in other causes of death were incidental hepatic congestion/ necrosis. Fatty liver was two times more common amongst patients with non-GIHBP causes of death than those with GIHBP causes. Table 1 summarizes all the causes of GIHBP causes of death and other causes of death.

Cause of death (n;%)	Gastrointestinal Findings	n;%	Hepatobiliary/Pancreatic Findings (%)	n;%
<b>GIHBP (86; 18.1%)</b>	Malignancies Varices/hemorrhage Ischemia/necrosis/infarct/ infection Diverticula/polyps/lipoma/ heterotropia/others	12;14.0% 17; 19.8% 32; 37.2% 20; 23.2%	Malignancy/metastasis Cirrhosis/end-stage liver disease Fatty liver (alcoholic/non-alcoholic) Pancreatitis/Hepatitis Incidental findings/others	20; 23.2% 37; 43.0% 11; 12.8% 10; 11.6% 20; 23.2%
<b>Cardiovascular/Pulmonary (264; 55.5%)</b>	Malignancies Hemorrhage/congestion/varices Ischemia/infection/infarct Diverticula/polyps/lipoma/ pancreatic heterotropia/others	10; 3.8% 13; 4.9% 16; 6.1% 85; 32.2	Malignancy/metastasis Congestion/necrosis Cirrhosis/end-stage liver disease Fatty liver (alcoholic/non-alcoholic) Incidental findings/others	10; 3.8% 89; 33.7% 11; 4.2% 70; 26.5% 27; 10.2%
<b>Neuropathological (18; 3.8%)</b>	Diverticula Polyp Infection/necrosis/others	5; 27.7% 3; 16.7% 2; 11.1%	Congestion/necrosis Cirrhosis/ fatty liver Others	10; 55.6% 2; 11.1% 3; 16.7%
<b>Infectious (47; 9.9%)</b>	Diverticula Polyp Others	6; 12.8% 2; 4.3% 14; 29.8%	Congestion/necrosis Cirrhosis/ fatty liver Others	23; 48.9% 9; 19.1% 9; 19.1%
<b>Malignant (other than GIHBP) (23; 4.8%)</b>	Metastasis Diverticula Polyp Infection/necrosis/others	6; 26.1% 4; 17.4% 2; 8.7% 4; 17.4%	Metastasis Congestion/necrosis Cirrhosis/ fatty liver Others	7; 30.4% 4; 17.4% 5; 21.7% 1; 4.3%
<b>Others (38; 8.0%)</b>	Diverticula Polyp Infection/necrosis/others	5; 13.2% 3; 7.9% 20; 52.6%	Congestion/necrosis Cirrhosis/ fatty liver Others	10; 26.3% 10; 26.3% 9; 23.7%

**Table 1:** 476 autopsies with GIHBP findings.

## Discussion

GIHBP pathology accounts for the second most common cause of death in our review. GIHBP findings at autopsies have been reported in individual cases or some small case series including post-transplant [7], post-infectious [4] and other autopsies but there hasn't been a complete review of all GIHBP autopsy findings to date. The most common GI cause of death was gastrointestinal ischemia/necrosis/infarct/infection (37%) and we know from the COVID-19 pandemic literature that respiratory, immune, and the digestive systems are the major targets of the disease in these cases at autopsy review [4]. In another study on autopsy findings in cardiac transplant patients they reported twenty-five percent of the autopsy patients having gastrointestinal and/or pancreatic abnormalities, principally mucosal inflammation, erosions or hemorrhage, and pancreatitis [7]. Although close to the reported percentage, our data showed a higher percentage of these findings.

The most common HBP cause of death was cirrhosis/end-stage liver disease (43%) along with variceal bleeding accounting for 20% of the deaths and fatty liver accounting for 13% of the deaths. With the obesity epidemic and non-alcoholic fatty liver disease on the rise, it is not surprising that such patients directly end up at the hospital close to death or dead. And hence it is not surprising that we found fatty liver twice more commonly amongst patients with non-GIHBP causes of death than those with GIHBP causes. In a case series on cases with gastrointestinal hemorrhage, they described a Case that revealed a peptic ulcer, with small vessels exposed on the surface of the ulcer. Melena was also observed throughout the intestine, although clotting was only observed inside the stomach. They also showed a Case which revealed diffuse massive clotting from the stomach to the upper portion of the ileum, which was due to a primary aortoduodenal fistula [8]. So in addition to variceal bleeding, gastrointestinal bleeding causing death could be other causes such as aortoduodenal fistula.

We found that 14% of the causes of GIHBP causes of death were due to gastrointestinal malignancies and 23% were due to HBP malignancies. The gastrointestinal tract isn't just a place for primary malignancies but also secondary malignancies; including melanomas, ovarian, bladder, breast and lung found in surgical pathology specimens most frequently [6] and lung, gynecologic malignancies, breast and pancreas found most commonly at autopsy [6]. Screening endoscopies/colonoscopies keep these patients restricted to the pool of surgical pathology specimens however; patients who do not undergo screening fall into the category of those who are first found at autopsy.

Other findings we found included diverticula, polyps, lipoma, heterotopia, pancreatitis and hepatitis, bile duct adenomas, gastrointestinal stromal tumors, neuroendocrine tumors, other mesenchymal tumors and hemangiomas. These pathologies are the well-known entities but registering them shows the importance of entities that aren't well-known in literature on autopsy. GIHBP pathology is a continuously evolving field and it is empirical to record findings since the GIHBP system is a target for various pathologies in the human body and yet a complete examination is only possible with timely autopsies to avoid autolysis of the tissues.

## Conclusion

GIHBP pathology is the second most common cause of death at autopsy at our institution. Significant incidental GIHBP findings not known during the patients' lives were found in both sets of patients that is, those with "GIHBP causes of death" as well as those with "other causes of death".

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