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President Warren G. Harding and the 5 Doctors Who Managed His Final Illness

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Abstract: Warren G. Harding was elected president of the United States in 1920 and died before he finished his third year in office. Early in 1923, he had progressive weakness, shortness of breath, and chest pain. In July of 1923, while on a western trip, he developed an episode of abdominal pain and fever. His trip was truncated and he was taken to the Palace Hotel in San Francisco, where 5 physicians attempted to treat his worsening symptoms. He died on August 2 of what was presumed to be a stroke. Historians have disagreed over the President's cause of death. This article reviews the medical evidence available from the doctors who cared for the President in an effort to define Harding's terminal illness.

Keywords: Cholecystitis; Heart disease; President Warren G. Harding

INTRODUCTION

Warren G. Harding was the 29th president of the United States. He was elected in November of 1920 and was in the third year of his presidency when he died during an extended west coast excursion. The President was not well during his final year in office, suffering from the prolonged effects of what was thought to be influenza. The weakness and orthopnea he experienced early in 1923, worsened during his west coast trip. On July 25, while traveling from Alaska to Vancouver, Canada, he developed abdominal pain and extreme fatigue and was thought to have contacted ptomaine poisoning from eating bad crab meat. When his symptoms intensified, the President's political and social appointments were canceled and he was transported to the Palace Hotel in San Francisco, hoping to rest and recover from his illness. The President's abdominal pain, tachypnea, and fever became so severe that 2 prominent Stanford physicians were contacted to provide medical consultation. A total of 5 doctors stayed at the Palace hotel for the next 5 days providing treatment and support for the failing president. Harding died on August 2, 1923, of what was reported to be a stroke. Since that time, medical historians have argued the etiology of his declining health, but currently, it is generally assumed that he died of a "heart attack." In this article, the primary physician sources that documented Harding's clinical course during his final month will be used in an attempt to establish his cause of death.

Background and Early Life

Warren Gamaliel Harding was born in Blooming Grove, Ohio, in 1865. His father was a homeopathic physician and his mother was a midwife. In addition to a medical practice, his father owned a small newspaper in Caledonia Ohio, *The Argus*. Harding attended the Ohio Central College, where he was the editor of the school newspaper, the *Iberia Spectator*. After college, Harding and his family moved to Marion, Ohio, where he purchased a failing newspaper, the *Marion Star*. Over the next 20 years, Marion, Ohio tripled in size and Harding made the *Star* a financially viable newspaper, with political influence in Marion and the surrounding county. Harding met his wife, Florence, in 1886 and they were subsequently married in 1891. Florence (5 years older than her husband) became a driving force in the success of the *Marion Star* and also in her husband's budding political career.[1,2]

POLITICAL CAREER

Harding was 22 years old when he became politically active in the Ohio Republican Party as a delegate to their state convention in 1888. In 1896, he traveled around the state giving speeches supporting the presidential candidacy of the former governor of the State of Ohio, William McKinley. In 1899, Harding was elected to the Ohio State Senate, he became the lieutenant governor in 1903 but lost the governor's race in 1910. His national political career was launched when he was chosen to nominate William Howard Taft for president on the Republican ticket at the 1912 convention in Chicago.[3] In 1915, he ran for and won the United States Senate seat from Ohio. In 1920, Harding was not an active presidential candidate, but the Chicago Republican Convention was deadlocked. Harding was the compromise candidate for the presidency and his running mate was Calvin Coolidge. The Democratic ticket featured James M. Cox from Ohio and a young Franklin Delano Roosevelt as the vice presidential nominee. Harding and Coolidge earned 60% of the popular vote and won in a landslide of electoral votes (Figs. 1–5).[1,2,4]

HARDING'S MEDICAL HISTORY

Harding's medical history began between 1889 and 1901 when he was admitted several times to the Battle Creek Sanatorium in Michigan for fatigue and a nervous illness. Some historians have suggested that these "breakdowns" were early manifestations of heart disease.[5] This seems unlikely given that there was never a suggestion of chest pain, shortness of breath, or left arm pain during the times Harding went to Battle Creek.[6,7]

Harding was diagnosed with hypertension in his late 40s, and it was a significant part of his medical history during his final illness. His systolic blood pressure was often measured at 180 mm

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Hg.[8] He did not seem to have symptoms from his hypertension until January of 1923 when he contracted an illness that was called "influenza."[9] Based on the available information, it is unclear if this represented influenza early in 1923 or complications of heart disease. In 1923, there is evidence that Harding developed shortness of breath that became worse when he was lying flat in bed. He generally slept poorly but always on several pillows.[8,10,11]

In June of 1923, Harding embarked on a presidential trip called his "Journey of Understanding," which included several western states, Canada, and the territory of Alaska.[12] The documented history of hypertension, inordinate fatigue, and orthopnea makes heart disease a likely explanation to account for all of these symptoms. Harding carried these symptoms with him as he started his lengthy western trip.

The President finished a 3-week tour of Alaska on July 25 when he departed from Sitka, by ship, on his way to Vancouver.[13] While on board the USS Henderson, Harding became very ill with fever, pain in his abdomen, no vomiting but an inability to eat. During the President's travels, he was accompanied by 3 doctors: his personal physician Dr. Charles E. Sawyer, Secretary of the Interior Dr. Hubert Work, and a military physician Dr. Joel T. Boone. The President's illness was described by Dr. Sawyer as ptomaine poisoning, possibly from eating tainted crab meat while on board ship.[14] The other physicians traveling with Harding did not believe that ptomaine poisoning was responsible for the President's symptoms since others in the party that ate the same crab meat did not get sick.[8] In 1923, the term "ptomaine poisoning" was used to describe food poisoning. Before 1900, scientists thought that decomposing proteins produced alkaloids that caused gastrointestinal illness when consumed in tainted food. By 1923, there was clear evidence that the common symptoms of "ptomaine poisoning" were due to bacterial contamination in the food.[15–17]

The President arrived in Vancouver on July 26, where during a round of golf, he told Dr. Boone that he was "not well at all."[18–20] Harding successfully gave a planned speech in Vancouver on July 26 and then traveled to Seattle, where he spoke to a large crowd on July 27. While giving his speech in Seattle, he became so weak that he dropped his article and looked as though he would not be able to finish. Herbert Hoover, the Secretary of Commerce who was traveling with the President, picked up the papers, reordered them so the President could find his place and finish the speech.[20] Hoover's wife, who was also part of the presidential party attending the speech, thought Harding's performance during that speech was poor, while Harding's wife was pleased that he was able to finish.[8] Harding's weakness was so great that he had trouble holding his hat and lifting his arm to wave to the crowds.[20]

The President's illness became worse on July 28 at Grants Pass Oregon as he was traveling by train to Yosemite Park. He continued to have abdominal pain, fever, weakness, and inability to eat. Due to the President's worsening condition, the rest of the President's trip was changed and he was moved directly to San Francisco. Dr. Boone examined the President as the train traveled through northern California and noted cardiomegaly and muffled heart sounds. He presumed this represented heart failure and alerted Hoover and the rest of the President's advisors of this critical finding. Harding arrived at the Palace Hotel on July 29.[8,21]

On July 29, Herbert Hoover and his wife each independently contacted the president of Stanford University, Dr. Ray Lyman Wilbur, by telegram and asked him to consult on the sick president. They requested that he bring with him the "best internist from the Stanford Hospital."[8] Wilbur considered 3 doctors from the Stanford faculty capable of consulting on the president of the United States, Harold P. Hill, Charles Miner Cooper, and Albion W. Hewlett. Hewlett, a cardiovascular expert, was head of the Department of Medicine at Stanford and had an active cardiovascular research laboratory.[22] Harold P. Hill was one of the most experienced diagnosticians in San Francisco in 1923 and he ran the medical service at the San Francisco Hospital.[23–25] Of these doctors, Charles M. Cooper was selected to consult on the President with Dr. Wilbur.

When Drs. Wilbur and Cooper met the President on the evening of July 29, the medical history they solicited began with his failure to improve after the flu earlier in the year. In addition, they noted Harding's history of hypertension, orthopnea, and chest pain radiating down both arms, especially the left. The Stanford physicians also recorded a history of upper abdominal pain usually at night, suggestive of biliary colic. On physical exam, the President's temperature was 102°F and his heart rate was between 120 and 130 beats per minute, including some irregular beats. His blood pressure was 150 systolic. His respiratory rate was fast, he got very short of breath when lying down flat but his lungs were clear. He had significant tenderness in the right upper quadrant which was worse with deep inspiration. Drs. Wilbur and Cooper felt that Harding was suffering from a gallbladder attack on top of a chronic problem with heart failure.[8,26,27]

On the morning of July 30, the President was still very ill, but when the doctors reevaluated him in the afternoon on the 30th, he had worsened and was diagnosed with pneumonia. His heart rate was 125 and his respiratory rate was 44 per minute, irregular and strained. He was described as having a "Cheyne–Stokes" respiratory pattern by Drs. Wilbur and Cooper.[27] The pneumonia was suggested by physical exam and chest x-ray, as the President struggled to breathe. In 1923, the doctors did not have antibiotics as a therapeutic option but treated his presumed pneumonia with digitalis and caffeine.[26,27]

Harding continued to have tachycardia and shortness of breath on July 31, but on August 1, after a second treatment with digitalis, he appeared to improve. His lungs were starting to clear, he no longer had signs of pneumonia, and his respiratory rate had decreased to 36 per minute. His heart rate was still elevated at 116 but his exhaustion had started to improve.[8,27]

As the morning of August 2 began, it appeared to be another good day. His abdominal pain had improved sufficiently that he was taking a small amount of food. His heart rate was regular at 100 and his systolic blood pressure was 140 mm Hg. He still had tachypnea but his breathing appeared less labored. Wilbur and the other doctors saw Harding at their usual 4 PM evaluation and his improvement continued. He died suddenly at 730 PM, in an event that was witnessed by his wife and Dr. Sawyer. Dr. Sawyer stated that the President had a "short quiver" just before death and called it a seizure, according to Dr. Wilbur's account.[8] Dr. Boone did not witness the final event but remembered the description provided by Dr. Sawyer… "he shook the bed violently, the body quivered, his color left him," and the "seizure departed just as fast as it came."[28] Otherwise, there were no other symptoms observed in the President's final hour.[27,29]

THE PRESIDENT'S DOCTORS

Charles E. Sawyer was a homeopathic doctor who graduated from the Cleveland Homeopathic Hospital College in Cleveland, Ohio. He settled in Marion, Ohio, and opened a Sanatorium where he provided homeopathic care throughout his career. Sawyer was acquainted with Harding's parents and he eventually became the personal physician to the Warren G. Harding family. Sawyer treated Florence Harding for a chronic kidney condition and she insisted that he accompany the Harding's to Washington, DC, after the presidential election. The new President appointed Sawyer as Assistant Surgeon General and a Brigadier General in the Army Medical Corps. Dr. Sawyer completely controlled Warren Harding's health care management during his presidency and especially during the President's final month. The other physicians managing Harding's health care

were often in conflict with Sawyer's homeopathic approach to the President's presumed heart disease. During his career, Sawyer served as a member of the Ohio State Medical Board, president of the Ohio Homeopathic Medical Society, and was a fellow of the American College of Surgeons.[30–34]

Joel Thompson Boone received his medical degree from Hahnemann Medical College in Philadelphia in 1913. He immediately joined the Navy Reserve and continued his medical education in the US Naval Medical School in Washington, DC, until 1915 when he received his commission in the Navy. In World War I, he was part of the American Expeditionary Force in France in 1918. He received the Medal of Honor, the Army's Distinguished Service Cross, and 6 Silver Stars for his heroic work in treating causalities during World War I. He is the most decorated physician in the history of the US military. He served in the Second World War and Korea and also served in the Harding, Coolidge, Hoover, Franklin Roosevelt, and Truman administrations. He retired from the Navy as a vice admiral, after which he became the Medical Director of the Department of Veteran Affairs. During the Harding administration, Boone was serving as physician on the presidential yacht, the USS Mayflower, and acted as an assistant to Sawyer in the care of the President.[35]

Hubert Work received his medical degree from the University of Pennsylvania in 1885. He founded the Woodcroft Hospital in Pueblo, Colorado, in 1896 and later became active in the Republican Party. After serving as a lieutenant colonel in the US Army in World War I, he became the president of the American Medical Association from 1921 to 1922. He served as the chairman of the Republican National Committee from 1928 to 1929. Under President Harding, he was the Postmaster General (1922–1923) and served Harding and Coolidge as the Secretary of the Interior from 1923 to 1928.[36] Dr. Work was traveling with President Harding on his western trip in his role as the Secretary of the Interior.

Ray Lyman Wilbur received his medical degree from Cooper Medical College in San Francisco (now Stanford Medical School) in 1899. After graduation, Wilbur had a meteoric career at Stanford. He was appointed as an assistant professor in 1900, Dean of the medical school in 1911, and president of Stanford University from 1916 to 1943. During that tenure, he served as the Secretary of the Interior in the Herbert Hoover administration (1929–1933). He was the president of the American Medical Association in 1923 during the time that he was consulting on President Harding.[37] Ray Wilbur met Herbert Hoover while they both lived in San Francisco. Hoover's wife, Lou Henry, was a close friend with Wilbur's wife, Marguerite, when they were coeds at Stanford.[38] The close relationship of these couples explains why both Herbert Hoover and Lou Henry Hoover reached out to Dr. Wilbur when it was obvious that the President needed more medical expertise as he arrived in San Francisco. When Dr. Wilbur became president of Stanford University in 1916, he stopped seeing patients; therefore, when he was contacted by the Hoovers, he was asked to come see the President and bring with him the best physician he could find, Charles Miner Cooper.

Charles Miner Cooper MB graduated from the University of Scotland, where he received his medical degree in 1897. Before he moved to the United States, he served as the president of the Royal Medical Society of Edinburgh. He was appointed as the Associate Professor of Medicine at the Cooper Medical College in San Francisco in 1908.[39] He served as a lecturer in Internal Medicine at the University of California and an Adjunct visiting physician at the German Hospital in San Francisco.[40] Cooper was no longer on the Stanford faculty in 1923 having left the faculty a year earlier with an illness.[41] At the time of Harding's presidency, Cooper was one of the best-known physicians in San Francisco. In the early 20th century, he was widely published on a variety of topics including cardiopulmonary pathology.[42–44]

WHAT WAS THE CAUSE OF DEATH?

During the President's medical evaluation at the Palace Hotel in San Francisco, the doctors made several diagnoses that were thought to have caused his death. They included apoplexy (stroke), acute gallbladder (cholecystitis), pneumonia, ptomaine poisoning (food poisoning), and overstrained cardiovascular system (ischemic heart disease). Below is a discussion of each diagnosis and the supporting medical evidence.

Stroke

The 5 physicians caring for Harding agreed that the cause of death was due to a stroke, but there has been controversy since that diagnosis was made.[28,45] Dr. Cooper sent a letter to Dr. Wilbur on August 13, 1923, to discuss the controversy about the cause of death. In the letter, he states that "many physicians will naturally wonder whether the sudden ending was not angina in character." He dismissed this possibility as he reminded Dr. Wilbur that the President's respiratory rate, blood pressure, and pulse had largely improved by August 2, suggesting that his cardiac function was stabilizing. In this letter, Cooper also reminded Wilbur about the witnessed seizure.[8] Two pieces of medical evidence supported the diagnosis of stroke: (1) the President's "seizure" at the time of death and (2) his abnormal breathing pattern during his last week of life (Cheyne–Stokes breathing). Dr. Sawyer is the only physician who witnessed the seizure at the time of the President's death. Sawyer was not always the most dependable diagnostician, and in fact, Dr. Wilbur described Sawyer as prone to "occasional attack of breakdown."[8] Given that Wilbur did not believe some of his medical findings (ie, the diagnosis of ptomaine poisoning), it is surprising that he believed Sawyer's description of a seizure. The doctors thought the abnormal breathing was caused by an ischemic injury to the brain stem and the seizure was the endpoint of that brain injury. During Cheyne–Stokes breathing, episodes of tachypnea alternate with periods of apnea or hypoventilation. Wilbur observed this breathing pattern during the President's final week and assumed it was due to abnormalities in brain stem function.[27] In the 1920s, Cheyne–Stokes breathing was often considered a symptom of brain dysfunction.[46] It had also been recognized as a symptom of heart failure.[47] If Dr. Sawyer's observation of a "short quiver" was not a seizure, and the abnormal breathing pattern was due to heart failure, the diagnosis of apoplexy (stroke) may have been in error.

Heart Disease

The President's history of dwindling health, orthopnea, shortness of breath, chest pain, and long-term hypertension certainly supports the diagnosis of ischemic heart disease and congestive heart failure. The symptoms of heart disease were so prominent that several physicians who never saw the President believed that he died of heart disease. Samuel A. Levine, the Harvard cardiologist, stated that he read all of the reports of the symptoms of Harding's illness and felt all were directly related to heart disease.[48] It is clear that President Harding was suffering from ischemic heart disease based on the primary medical information available as nicely summarized by Pinals and Smulyan.[5] A cardiac arrhythmia due to underlying myocardial ischemia would certainly explain the sudden nature of the President's death but a confirming EKG was not done on the evening of August 2.

Cholecystitis or Ptomaine

It is unlikely that food poisoning had anything to do with the President's demise. The physicians caring for him questioned passengers on the USS Henderson and the President was the only person who got sick after eating crab meat. On the other

hand, there is ample evidence that some of the President's symptoms represented gallbladder disease. The doctors noted that Harding had a long history of upper abdominal pain suggestive of biliary colic.[8] Reports released to the press during Harding's last week and private notes recorded Dr. Wilbur state that the President had abdominal pain, anorexia, fever, and pain to palpation in the gallbladder region.[8,27] Other authors have suggested that right heart failure and congested liver might have led to the right upper quadrant pain experienced by Harding, but this was not the conclusion of any of the doctors who examined him.[5] The doctors who cared for the President thought that he was experiencing an episode of cholecystitis in the setting of significant heart disease. This diagnosis is listed on the President's death certificate.[49] Other gastrointestinal diseases that could have explained some of the President's abdominal pain include pancreatitis or peptic ulcer disease. In 1923, distinguishing complicated peptic ulcer disease versus pancreatitis versus gallbladder disease was solely dependent on the patient's history and physical exam.[50]

Pneumonia

The diagnosis of pneumonia, made on July 30 during the President's pulmonary decompensation, rapidly improved over the following 2 days. By July 31 and certainly August 1, his respiratory rate decreased and his lungs became clear on exam. This improvement occurred following the treatment with digitalis and caffeine. Digitalis was a common treatment for pneumonia in the 1920s. It was presumed that the heart was damaged by the bacterial process in the lungs ("pneumonic heart"), and therefore, digitalis was considered to be an adjuvant treatment of pneumonia.[51,52] Caffeine was also considered a cardiac stimulant and was part of the routine management of pneumonia whenever "circulatory weakness" was suspected.[53] The use of convalescent serum or inoculated horse serum to treat pneumonia was described in the early 1900s and was commonly employed through the 1920s and 1930s.[51,54,55] Serum was not used on Harding, probably due to the rapid improvement of his pneumonia symptoms. The introduction of sulfapyridine and eventually penicillin in the 1940s made serum treatment for pneumonia obsolete.[56] It is possible that pulmonary edema secondary to congestive heart failure caused the July 31 "pneumonia" findings. The combination of digitalis' impact on contractility and the diuretic effect of caffeine may have been enough to produce the improvement observed by the doctors.[5]

ANALYSIS OF HARDING'S CARE

There are 3 sources documenting the medical condition of President Harding during his final days that have been used by previous historians. First, the doctors released daily updates on Harding's medical condition to the press. Second, Dr. Wilbur recorded the medical events of the President's final week. Third, Dr. Boone kept a "diary" of Harding's health care. This article relies on the first 2 sources plus the Boone biography written by his son which incorporates large portions of the "diary."[19] Based on these sources, the following conclusions about Harding's health are made. The President had evidence of heart disease and heart failure based on history, physical exam, and response to the therapy (digitalis and caffeine). In addition, the President's history and physical exam suggested that the clinical deterioration which occurred after leaving Alaska on July 25 was an episode of cholecystitis. It seems likely that the recorded signs and symptoms of pneumonia were, in fact, pulmonary

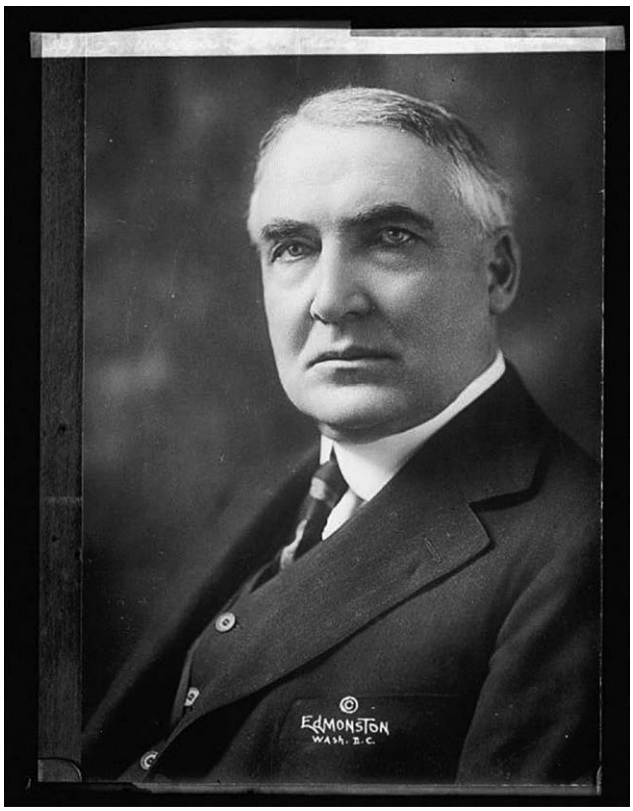

FIGURE 1. Warren G. Harding, c1920. From the Library of Congress https://www.loc.gov/pictures/resource/npcc.29220/.

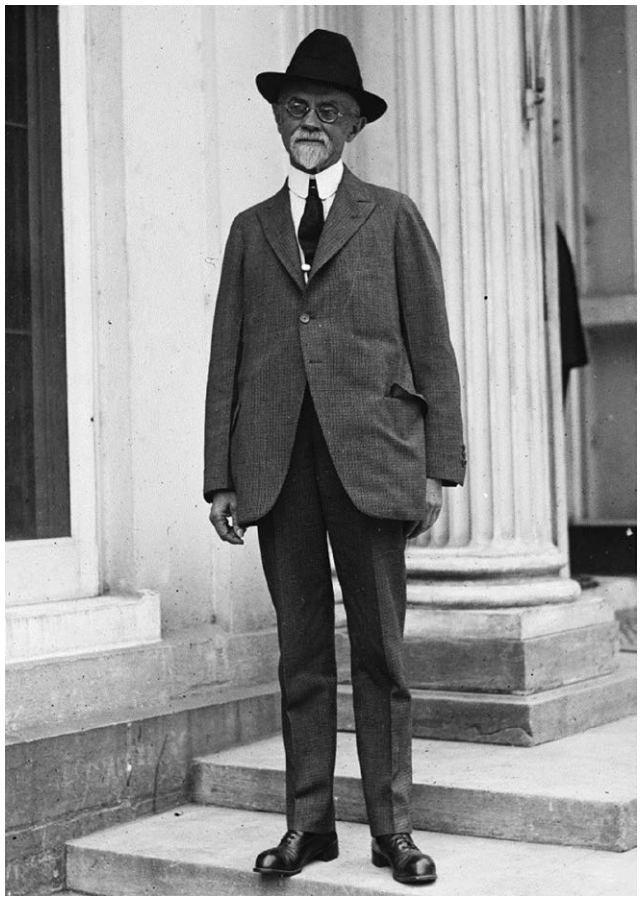

FIGURE 2. Dr. Charles E. Sawyer in from of the White House, Washington, DC, 1923. From the Library of Congress https://www.loc.gov/pictures/resource/hec.43330/.

FIGURE 3. Ray Lyman Wilbur, MD. March 5, 1929. From the Library of Congress https://www.loc.gov/pictures/resource/npcc.17100/.

edema since they responded rapidly to the digitalis and caffeine. Determining the final cause of death is more problematic. It is possible that Harding suffered a fatal cardiac arrhythmia at 7:30 PM on August 2, given the background of obvious ischemic heart disease. The findings that suggested that Harding experienced a stroke may have been misinterpreted. It is possible that the "short quiver" witnessed by Sawyer was not a seizure, and the observed Cheyne–Stokes breathing was a sign of heart failure.

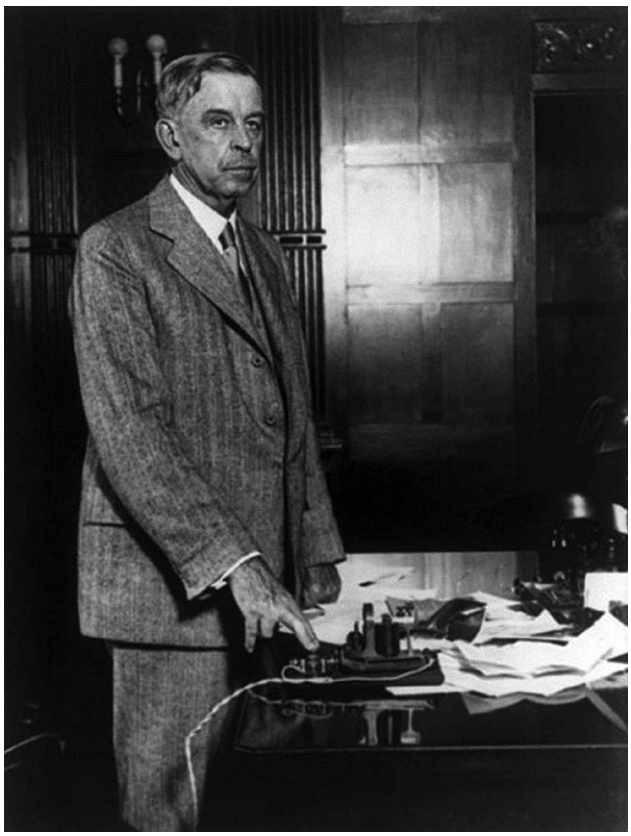

FIGURE 4. Hubert Work, MD. June 20, 1928. From the Library of Congress https://www.loc.gov/pictures/item/2003666696/.

FIGURE 5. Joel Thompson Boone, MD. February 10, 1923. From the Library of Congress https://www.loc.gov/pictures/resource/npcc.23844/.

Why Was the President Cared for at a Hotel Instead of a Hospital?

Presidents that received intense medical treatment before the 1950s were commonly cared for in the White House or other private environments. When Garfield was shot on July 2, 1881, he was taken directly to the White House to recover.[57] Grover Cleveland was operated on for a maxillary tumor in 1893 on a ship in the New York harbor and recovered at his summer home in Bourne, Massachusetts.[58] In 1901, McKinley was shot in Buffalo, was operated on in a small clinic on the grounds of the Pan-American Exposition, and recovered at a private home until his death on the 8th postoperative day.[59] Woodrow Wilson suffered several neurologic events as president and all were managed in the White House.[60] Franklin Delano Roosevelt had a variety of serious medical problems managed by his physicians outside of a hospital environment.[61] The management of presidential illness appeared to change in the 1950s; Eisenhower had a heart attack and an operation for bowel obstruction in 1955 and 1956, and both times, the President was treated as an inpatient at major hospitals.[62] Given that Harding was simply given supportive care, and all necessary resources (including an x-ray machine) were brought to the Palace Hotel, it is very likely that Harding would not have benefited by transfer to a local San Francisco Hospital.

The Problem of Multiple Doctors

Medical and surgical treatment of presidential illness is usually complicated and often managed by multiple physicians who conflict over decision-making. The management of Presidents Garfield, McKinley, and Eisenhower were all examples of care complicated by more than 1 doctor in charge.[57,59,62] Harding's care was made difficult by the fact that his homeopathic-based primary doctor, Charles Sawyer, was not best suited to sort out the intricacies of his worsening cardiac symptoms before August of 1923. The controversy generated within the team of doctors led directly to some of the confusion about the eventual diagnosis. In more recent years, the medical manage of presidents has been less confused, as seen by the team of doctors that cared for Lyndon B. Johnson as he was treated for cholecystitis and Ronald Reagan as he was managed after the attempted assassination of 1981. In each case, the doctors appeared to work together to present consensus and a clear plan instead of discord and confusion.[63,64]

Occam's Razor and Harding's Diagnosis

Occam's razor, or parsimony as it applies to differential diagnosis, suggests that most of a patient's symptoms are explained by 1 diagnosis, not 2.[65] It is common for professional and pop-historians to summarize medical illness of historical figures under 1 diagnosis. If history writing is storytelling, then the application of Occam's Razor, or the selection of 1 diagnosis, makes the medical story easier to understand. In the case of Harding, almost every reference to his cause of death that is reported in any history writing states that he died of a "heart attack."[66–68] Pinals and Smulyan[5] and Ferrell[45,48] seem to apply Occam's Razor as they conclude that heart disease explains all of the President's signs and symptoms. They have chosen to ignore or minimize Harding's other symptoms or try to fold all of his symptoms under the cardiovascular category. Despite the fact that several of the physicians who cared for Harding thought he suffered from gallbladder disease, Pinals attempts to explain the President's right upper quadrant pain as hepatic capsule distension associated with right heart failure.[5] On the other hand, a careful reading of Wilbur's account of the medical history, signs, and symptoms, suggests that there was ample evidence that Harding suffered from chronic cholecystitis before July of 1923 and an attack of acute cholecystitis before his death.

SUMMARY

President Harding died in San Francisco in August of 1923 after a short illness, under the care of 5 physicians. The death certificate stated that the President died of a stroke during an episode of cholecystitis and pneumonia, with underlying atherosclerotic vascular disease. This article has reviewed the documents available from the physicians that were present and reevaluated the data based on our understanding of current medical science. Based on this information, it is likely that the President had underlying clinically significant heart disease and developed cholecystitis in July of 1923. The stress of his gallbladder attack may have worsened his ischemic heart disease as he showed signs of progressive heart failure. On August 2, as he started to improve his gallbladder symptoms, he died suddenly of what was likely an arrhythmia due to his underlying ischemic heart disease.

REFERENCES

1. Harding WG. A good middle west Republican. The Manchester Guardian. August 4, 1923:8.
2. Hartwell ACB. Hardings: *History of the Harding Family*. Boston, MA: Will H. Chapple Press; 1936: 122–132.
3. Harding to name Taft. The Washington Post. June 8, 1912:3.
4. Henning AS. Harding wins by landslide. Los Angeles Times. November 3, 1920:I1.
5. Pinals RS, Smulyan H. The death of President Warren G. Harding. Am J Med Sci. 2014;348:232–237.
6. Sinclair A. The Available Man, the Life Behind the Masks of Warren Gamaliel Harding. New York: The Macmillan Company; 1969:286.
7. Landau E. Warren G. Harding. Minneapolis: Lerner Publications Company; 2005:24–35.
8. Robinson EE, Edwards PC. The Memoirs of Ray Lyman Wilbur. Redwood City, CA: Stanford University Press; 1960:378–385.
9. President Harding's illness. The Manchester Guardian. January 29, 1923:13.
10. Doctors tell of sickness: harding had not recovered from the influenza. Los Angeles Times. August 3, 1923:17.
11. Sugrue T, Starling EW. Starling of the White House. New York: Simon and Schuster, 1946:189.
12. Fish, hunt and talk: high lights in Harding tour. Los Angeles Times. June 18, 1923:I1.
13. Alaska: his last day is spent at Sitka. The New York Times. July 23, 1923:4.
14. Harding has attack of ptomaine poison. The New York Times. July 29, 1923:1.
15. Bynum B. Ptomaine poisoning. Lancet. 2001;357:1050.
16. Hutchens HJ. Ptomaine Poisoning.-I. Hospital (Lond 1886). 1911;50:511–512.
17. Stevenson T. Poisoning by sardines: a toxic ptomaine. Br Med J. 1892;2:1326–1327.
18. Military display greets President on Canadian visit. The Washington Post. July 27, 1923:1.
19. Heller MF. The President's Doctor. New York: Vantage Press; 2000:58.
20. Ferrell RH. The Strange Deaths of President Harding. Columbia, MO: University of Missouri Press; 1996:12.
21. Heller MF. The President's Doctor. New York: Vantage Press; 2000:62.
22. Stanford Medicine Lane Medical Library. *Stanford University School of Medicine and the Predecessor Schools: An Historical Perspective Part V. The Stanford Era. Chapter 35. Dean Ophuls' Administration 1916–1933*. April 1913. Available at: https://lane.stanford.edu/med-history/wilson/chap35.html. Accessed April 2, 2020.
23. LaDou J. *A History of UCSF, Special Topics: UCSF Stanford Merge*. Available at: https://history.library.ucsf.edu/stanford_merger.html. Accessed April 3, 2020.
24. Stanford University. *Department of Medicine, Annual Announcement*. 1913–1914:8. Available at: https://books.google.com/books?id=lzV-JAQAAMAAJ&pg=PA8&lpg=PA8&dq=Harold+Phillips+Hill++Stanford+university&source=bl&ots=tfWp-n3pvw&sig=ACfU3U1Z7gBcSTEvu3r1AONtxZglq3H50g&hl=en&sa=X&ved=2ahUKEwjYwpHQq6DoAhUrmuAKHWYYBLQQ6AEwAXoECAkQAQ#v=onepage&q=Harold%20Phillips%20Hill%20%20Stanford%20university&f=false. Accessed April 4, 2020.
25. *Annual Report of the President of Stanford University*. 1922:169. Available at: https://www.google.com/books/edition/Annual_Report_of_the_President_of_Stanfo/

nFkWAAAAIAAJ?hl=en&gbpv=1&dq=stanford+department+of+medicine+annual+announcement+1923&pg=RA2-PA266&printsec=frontcover#spf=1585417744824. Accessed April 5, 2020.
26. Ominous signs in afternoon. The New York Times. July 31, 1923:2.
27. Wilbur RL, Cooper CM. President Harding's last illness. JAMA. 1923;81:603.
28. President Harding dies of stroke. The Atlanta Constitution. August 3, 1923:1.
29. Heller MF. The President's Doctor. New York: Vantage Press; 2000:67.
30. Gen. Sawyer dies suddenly at home in Marion. The Washington Post. September 24, 1924:1.
31. Brig. General Sawyer dies in his sleep. The New York Times. September 24, 1924:19.
32. Dixon J. Hardings obey physician, Gen. Sawyer says; fighting spirit makes them rugged. The Washington Post. April 24, 1921:27.
33. Anthony CS. Florence Harding. New York: William Morrow and Company; 1998:86–87.
34. Anthony CS. Florence Harding. New York: William Morrow and Company; 1998:376–377.
35. Halley JR. Adm. Joel Boone, physician to 3 presidents, dies. The Washington Post. April 4, 1974:1.
36. Dr. Hubert Work, twice a cabinet member, is dead. Chicago Daily Tribune. December 15, 1942:18.
37. Ray Lyman Wilbur. The New York Times. June 28, 1949:26.
38. Mrs. R.L. Wilbur is close friend of first lady. The Atlanta Constitution. March 11, 1929:16.
39. Professor Charles Miner Cooper. Calif S J Med. 1908;6:398.
40. Heintz EL. *Alpha Kappa Kappa Fraternity Cataloque, Chicago Illinois*. 1909:183. Available at: https://books.google.com/books?id=1UJHAQAAMAAJ&pg=PA183&lpg=PA183&dq=charles+miner+cooper+MB+san+francisco&source=bl&ots=83kt_SQWB7&sig=ACfU3U3tJTZS_TnV3XF2tl5rpBZeVjR2nw&hl=en&ppis=_e&sa=X&ved=2ahUKEwiGreuE2proAhWjUt8KHQAhAygQ6AEwAXoECAsQAQ#v=onepage&q=charles%20miner%20cooper%20MB%20san%20francisco&f=false. Accessed April 7, 2020.
41. *Annual Report of the President of Stanford University*. August 31, 1922:43. Available at: https://www.google.com/books/edition/Annual_Report_of_the_President_of_Stanfo/nFkWAAAAIAAJ?hl=en&gbpv=1&dq=stanford+department+of+medicine+annual+announcement+1923&pg=RA2-PA266&printsec=frontcover#spf=1585417744824. Accessed April 6, 2020.
42. Jellick EO, Cooper CM, Ophuls W. The Adams-Stokes syndrome and the bundle of His. JAMA. 1906;46:955.
43. Cooper CM. The respiratory ratio: a preliminary note. JAMA. 1909;52:1182.
44. Jellinek EO, Cooper CM. Report, with comment, of six cases of heart-block, with tracings, and one post-mortem examination of the heart. Br Med J. 1908;1:796–801.
45. Ferrell RH. The Strange Deaths of President Harding. Columbia, MO: University of Missouri Press; 1996:30–49.
46. Rankin G. Cerebral haemorrhage. Hospital (Lond 1886). 1912;52:35–36.
47. MacKenzie KA. The evidence of organic heart disease. Can Med Assoc J. 1923;13:406–410.
48. Ferrell RH. The Strange Deaths of President Harding. Columbia, MO: University of Missouri Press; 1996:26–29.
49. Report on cause of death: San Francisco certificate shows Harding had complications. The New York Times. August 8, 1923:2.
50. Graham RR. Cholecystitis: etiology, diagnosis and treatment. Arch Surg. 1921;3:154–167.
51. Avery OT, Chickering HT, Cole R, et al. *Acute Lobar Pneumonia. Prevention and Serum Treatment. Monograph No 7. Of the Rockfeller Institute for Medical Research*. October 16, 1917. Available at: https://core.ac.uk/download/pdf/214338468.pdf. Accessed June 1 2020.
52. Thomas HM. Pneumonia at Camp Meade, Maryland. JAMA. 1918;71:1307–1310.
53. Lindsay JA. A clinical study of pneumonia. Br Med J. 1913;1:1193–1196.
54. McGuire LW, Redden WR. Treatment of influenza pneumonia by the use of convalescent human serum. JAMA. 1918;71:1311–1312.
55. Kinsey HI, Brown WH, Feasby WR. Antipneumococcus serum treatment of pneumonia. Can Public Health J. 1940;31:56–61.
56. Podolsky SH. The changing fate of pneumonia as a public health concern in the 20th century America and beyond. Am J Public Heath. 2005;95:2144–2154.
57. Pappas TN, Joharifard S. Did James A. Garfield die of cholecystitis? Revisiting the autopsy of the 20th president of the United States. Am J Surg. 2013;206:613–618.
58. Murray M, Pappas TN, Powers DB. Maxillary prosthetics, speech impairment, and presidential politics: how Grover Cleveland was able to speak normally after his "secret" operation. Surg J (N Y). 2020;6:e1–e6.
59. Pappas TN, Swanson S. Anarchy and the surgical care of President William McKinley. J Trauma Acute Care Surg. 2012;72:1106–1113.
60. Marmor MF. Wilson, strokes, and zebras. NEJM. 1982;307:528–535.
61. Bruenn HG. Clinical notes on the illness and death of President Franklin D. Roosevelt. Ann Int Med. 1970;72:579–591.
62. Pappas TN. President Eisenhower's bowel obstruction: the story of his surgeons and their decision to operate. Ann Surg. 2013;258:192–197.
63. Pappas TN, Mulvihill MS. The president's gallbladder: a historical account of the cholecystectomy of Lyndon Baines Johnson. Surgery. 2010;147:160–166.
64. Aaron BL, Rockoff SD. The attempted assassination of President Reagan. JAMA. 1994;272:1689–1693.
65. Hilliard AA, Weinberger SE, Tierney LM, et al. Occam's Razon versus Saint's Triad. NEJM. 2004;350:599–603.
66. Greenspan J. The unexpected death of President Harding. *The History Channel*. January 21, 2020. Available at: https://www.history.com/news/the-unexpected-death-of-president-harding. Accessed July 6, 2020.
67. Bomboy S. Generations later, President Warren Harding's sudden death recalled. *Constitution Daily*. August 1, 2019. Available at: https://constitutioncenter.org/blog/after-90-years-president-warren-hardings-death-still-unsettled. Accessed July 6, 2020.
68. Trani EP, Warren G. Harding: life after the presidency. *The Miller Center*. Available at: https://millercenter.org/president/harding/death-of-the-president. Accessed July 6, 2020.