

## George Washington's infertility: Why was the father of our country never a father?

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George Washington was the single most important figure in the founding of the United States of America. Numerous biographies of Washington have been written and his name is honored in countless ways, including as the name of the United States' capital. Washington has become so idealized in U.S. consciousness that it is easy to lose sight of his failings and disappointments. Undoubtedly, one of his most personal sorrows was his inability to have a child with his wife Martha. As the historian W.S. Randall puts it, "He was content with Martha, but mystified why, year after year, he and Martha could produce no Washington heir." In this article, George and Martha Washington's inability to have children is discussed, and it is suggested that George was the likely source of the couple's infertility. The author also speculates as to the cause of Washington's infertility and its effect on the course of American history. Frank discussion of Washington's infertility might provide some comfort to men struggling with infertility today. (Fertil Steril® 2004;81:495–9. ©2004 by American Society for Reproductive Medicine.)

George Washington was born in 1732, near Pope's Creek, Virginia. When he was 22, Washington joined the Virginia Militia and served alongside the English for 3 years in the French and Indian War in western Pennsylvania. After the war, Washington returned home and married Martha Dandridge Custis, a 27-year-old widow with two small children. For the next 16 years he was a farmer and local politician in Virginia. Because of Washington's experience as a soldier and the high esteem in which he was held, he was given command of the Continental Army after the bloody debacle at Bunker Hill in June 1775. After successfully forcing the English out of Boston, Washington moved the Continental Army to New York, where he was defeated by the British under General Howe and forced to retreat across New Jersey, eventually crossing into Pennsylvania. Washington reversed the momentum of the war with his daring Christmas attack at Trenton and later at Princeton, but his army was later defeated at Brandywine and Germantown and forced to surrender the capital of Philadelphia and spend the bitter winter of 1777 at Valley Forge, in Pennsylvania.

Despite repeated losses to the British, Washington managed to keep the Continental Army intact and in the field, demonstrating to

the world that the English would not have an easy victory. His perseverance eventually helped convince King Louis XVI of France to aid the colonists' struggle. In 1781, after several years of stalemate in the north, the forces of Washington, combined with the French army and navy, surrounded the entire British southern army under Cornwallis on the Yorktown peninsula, forcing Cornwallis to surrender. This devastating British defeat eventually led to the cessation of hostilities and ultimately to victory for the colonists. After the war's end, Washington resigned, returning control of the Continental Army to Congress and he returned to Mt. Vernon.

In 1787, he led the Virginia delegation to the Constitutional Convention and in 1788 was unanimously elected president by the newly formed House of Representatives. Washington served as president for 8 years, from 1789 to 1797, establishing the National Bank and wisely avoiding war with European powers. Sadly, his retirement at Mt. Vernon was brief. In December 1799, Washington died suddenly of "quinsy"—probably either a peritonsillar abscess or epiglottitis. His death was likely hastened by the aggressive phlebotomy practiced by his physicians (1–6).

Received May 6, 2003;  
revised and accepted  
August 11, 2003.

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0015-0282/04/\$30.00  
doi:10.1016/j.fertnstert.2003.08.035

## WASHINGTON'S FAMILY

Discussion of George and Martha Washington's infertility begins with an examination of Washington's marriage to Martha Dandridge Custis Washington (1731–1802) in 1759. At the time of their marriage, Martha was a widow. She had married Daniel Custis at age 17 and had four children by him in 8 years, two of whom (Patsy and John) survived infancy. Washington and Martha met in 1758 and quickly decided to marry; at the time both were 27 years old. After marrying Martha, Washington adopted both of Martha's children and was by all accounts a loving and caring stepfather. Sadly, both of his stepchildren predeceased him. Patsy died of epilepsy at 16 and John died at 28 of malaria. John had four children before his death, two of whom were subsequently raised by George and Martha.

These facts make it seem unlikely that George and Martha's infertility was attributable to Martha: her considerable fecundity is evidenced by the birth of four children in 8 years of marriage to Daniel Custis. Furthermore, no evidence exists that her last pregnancy was complicated by postpartum infection or hemorrhage leading to uterine fibrosis or Asherman's syndrome, which might have made additional pregnancies impossible.

Regarding George and Martha's relationship, there is fairly strong evidence that it was an intimate one. Washington's few surviving letters to Martha show a man with a deep and abiding love and respect for his wife. Not surprisingly for his time, Washington attributed his and Martha's infertility to Martha, and by age 54 seemed resigned to never fathering an heir, writing:

...if Mrs. Washington should survive me there is a moral certainty of my dying without issue and should I be longest lived the matter, in my opinion, is hardly less certain for while I retain the faculty of reasoning, I shall never marry a girl; and it is not probable that I should have children by a woman of an age suitable to my own should I be disposed to enter in a second marriage. (7)

From his writings, it is clear that Washington desired a child an heir. This, in combination with his intimate relationship with a fertile partner, makes it likely that Washington suffered from male infertility.

### GEORGE WASHINGTON'S INFERTILITY

The differential diagnosis for Washington's infertility includes conditions from each of the six major categories of male infertility (Table 1). Could Washington have had Klinefelter's syndrome or another cause of germ-cell failure? Klinefelter's syndrome is typified by tall stature, testicular failure, and mild to severe cognitive deficits, especially in terms of visuospatial and language abilities (8). Klinefelter's syndrome could explain Washington's remarkable height. Washington was extremely tall—probably more

TABLE 1

Possible causes of George Washington's infertility, by category.

Category	Cause
Germ-cell failure	Klinefelter's syndrome, Y chromosome microdeletions
Endocrine disease	Kallmann's syndrome, pituitary dysfunction
Anatomic infertility	Absent vas deferens, cryptorchidism, varicocele
Sexual dysfunction	Inadequate frequency, erectile or ejaculatory dysfunction
Toxic exposures	Mercurous chloride (calomel)
Infections	Gonorrhea, chlamydia, tuberculosis

Amory. *George Washington's infertility*. *Fertil Steril* 2004.

than 6 feet 3 inches (9, p. 34)—a veritable giant for his age; however, tall stature was a family trait. A diagnosis of Klinefelter's syndrome would also provide an explanation for his well-documented dental woes, because many individuals with Klinefelter's syndrome suffer from taurodontism, a genetic enlargement of the tooth pulp, which predisposes to premature dental caries (10).

Arguing against Klinefelter's syndrome are contemporary descriptions of Washington as powerfully muscled and as a superb horseman, certainly not consistent with hypogonadism and visuospatial dysfunction. In addition, Washington's speeches and surviving writings demonstrate a superior facility with language, making Klinefelter's syndrome seem very unlikely. It is possible that Washington could have had a genetic cause of infertility, such as microdeletions in the Y chromosome, which are thought to cause approximately 7% of all male factor infertility (11).

Could Washington have had endocrine dysfunction, such as testosterone or gonadotropin deficiency? Congenital gonadotropin deficiency, or Kallmann's syndrome, could have resulted in Washington's tall height; however, there is no evidence that he suffered from severe testosterone deficiency. In fact, stories abound testifying to his great strength and vigor. As a child, he was noted to be an enthusiastic and superior athlete, running, wrestling, and horseback riding with great skill. In 1760, his adjutant, George Mercer, described him as possessed of:

...well-developed muscles indicating great strength. His bones and joints are large as are his hands and feet . . . His mouth discloses some defective teeth . . . His movements and gestures are graceful, his walk majestic and he is a splendid horseman (12, p. 191)

Also arguing against endocrine dysfunction is an absence of difficulties with peripheral vision, osteoporosis, gynecomastia, pronounced fatigue, or depression. Therefore, endocrine

dysfunction seems an unlikely cause of infertility for Washington.

Could Washington's infertility have been due to congenital anatomic causes, such as cryptorchidism, absence of the vas deferens, or a varicocele? Congenital absence of the vas deferens can occur either spontaneously or in association with certain diseases, such as cystic fibrosis. Washington clearly did not have cystic fibrosis, but a spontaneous absence of the vas is possible, if rare. Because either cryptorchidism or a varicocele would likely have a greater impact on sperm production than testosterone secretion, either could explain Washington's infertility; however, unless severe, these conditions cause infertility infrequently (13, 14).

Could Washington have had sexual dysfunction? Retrograde ejaculation is unlikely in the absence of spinal cord trauma, neuropathy, or urologic surgery. Erectile dysfunction due to diabetes or vascular disease seems implausible in such a healthy, vigorous man. Inadequate sexual frequency is theoretically possible but unlikely because Washington's relationship with Martha was intimate, and as a farmer and expert mule breeder he was certainly well aware of the necessary means!

Could Washington's infertility have been due to toxic exposures? It is interesting to note that Washington used calomel (mercurous chloride) extensively during his early 20s for treatment of his chronic bloody diarrhea and abdominal pain (see below). Although mercury exposure has been shown to lead to a decrease in sperm counts in higher mammals (15), this effect is usually transient and is an unlikely cause of long-term infertility.

Male infertility can be caused by infections of the testis, epididymis, or prostate caused by mumps, sexually transmitted disease (e.g., gonorrhea or chlamydia), or tuberculosis. As was the case for most individuals in the 18th century, Washington had an impressive variety of illnesses during his life, including mumps. However, orchitis in association with mumps infection does not occur before puberty (16), making mumps an unlikely cause of infertility in Washington, who had mumps during early childhood (9, p. 34). A sexually transmitted disease seems unlikely in Washington's case, given his character and strong sense of moral propriety.

The one infection that Washington likely contracted that might explain his infertility is tuberculosis. During Washington's life, tuberculosis was very common and frequently lethal. One historian has estimated that one quarter of all adult deaths in Europe at the time were due to tuberculosis (17). In those who did not succumb initially, the infection was frequently life-long, and extrapulmonary manifestations were common.

Washington's likely exposure to tuberculosis was via his brother Lawrence, who was dying of the disease when George accompanied him to Barbados in 1751 at age 19. While in Barbados, Washington contracted smallpox and

was very ill (9, p. 61), a circumstance that would have weakened his immunity considerably. On his return from Barbados, Washington spent several months combating pleurisy. Given the timing and duration of this illness, it was quite probably an initial pulmonary infection with tuberculosis, contracted from his brother. Shortly after Washington's recovery from pleurisy, Lawrence died from tuberculosis (18, p. 263).

George spent much of the next several years fighting with the English against the French during the French and Indian War. During this period, he was troubled with repeated attacks of bloody diarrhea, abdominal pain, and fever (9, pp. 132, 165–70). These recurrent episodes of bloody diarrhea over years are inconsistent with bacterial dysentery (19) or inflammatory bowel disease and given his likely pulmonary infection with tuberculosis probably represented enteric tuberculosis. Upwards of 70% of individuals with untreated pulmonary tuberculosis will develop gastrointestinal tuberculosis from swallowing the highly infectious pulmonary secretions (20). Such individuals are frequently symptomatic, with fever, bloody diarrhea, and abdominal pain (21).

It is interesting to note that Washington himself feared that he might have tuberculosis, the disease he had seen slowly kill his older brother. By November 1757 Washington was so feeble that he could barely walk and was warned by a local doctor that he was exhibiting signs of "decay"—the term for tuberculosis (9, p. 170). In late 1757 he wrote:

My disorder at times returns obstinately upon me in spite of the efforts of all the sons of Aesculapius. At certain times, I have been reduced to great extremity. . . . My constitution is certainly greatly impaired (and) nothing can retrieve my health but the greatest care. . . . (9, p. 169)

Fortunately, Washington recovered before meeting Martha and was never again troubled with abdominal pain. It seems possible, however, that before his marriage to Martha he developed genitourinary tuberculosis in addition to his likely gastrointestinal infection. Classic studies of soldiers with tuberculous pleurisy during World War II demonstrated that two thirds developed chronic organ tuberculosis within 5 years of their initial infection (22). Infection of the epididymitis or testes is seen in 20% of these individuals and frequently results in infertility (23, 24).

Given the absence of evidence for another source of Washington's infertility and his exposure to and symptoms of tuberculosis, I propose that the most likely cause of George Washington's infertility was tuberculous epididymitis. However, I cannot rule out idiopathic causes of germ-cell failure, such as microdeletions in the Y chromosome, or anatomic abnormalities, such as congenital absence of the vas deferens, varicocele, or cryptorchidism as potential causes of Washington's infertility.

How would one approach the diagnosis of Washington's infertility today? A work-up would begin with a history and

physical examination and a seminal fluid analysis. If sperm were absent, imaging of the vas deferens and ejaculatory duct would be performed to distinguish between failure of sperm production and obstruction. If abnormalities on testicular examination were noted, a testicular ultrasound would be indicated. Tuberculous infection of the epididymitis can lead to massive dilatation of the organ (25), and aspiration of epididymal contents for culture could be performed. If tuberculosis were diagnosed, treatment with isoniazid and rifampin for 9 months would be recommended; however, this therapy would be unlikely to reverse obstructive azoospermia, given the scarring of the epididymis resulting from the infection (26).

Treatment of Washington's infertility would vary depending on whether sperm were present in an ejaculated semen specimen. If present, sperm could be used in intrauterine insemination, IVF, or intracytoplasmic sperm injection (ICSI). If sperm were absent from an ejaculated specimen, testicular biopsy or aspiration could be performed to attempt sperm retrieval. If sperm were isolated from the testicular biopsy, ICSI could be performed (27). Intracytoplasmic sperm injection has been used successfully to treat obstructive azoospermia secondary to tuberculous epididymitis with a success rate of greater than 50% (28).

### WASHINGTON'S INFERTILITY: HISTORICAL IMPACT

One wonders about the impact of Washington's infertility on the course of history. Most tempting is to speculate as to whether his lack of an heir impacted on his willingness to return power to the relatively weak Congress at the end of the Revolutionary War. At the war's conclusion he easily could have contemplated becoming a military dictator or even installing himself as king. Indeed, many on his own general staff urged him to do so (9, p. 403). To his credit, however, Washington resigned his commission and returned to his Virginia farm. This act, wherein the leader of a successful military revolution voluntarily returns power to a civil authority is almost unique in history and is one of the reasons Washington was so revered by his contemporaries and eventually unanimously selected to become the nation's first president 5 years later in 1788.

A more likely effect of Washington's infertility was that he tended to nurture promising young men to whom he was not related. Most prominent of these was his favorite, the Marquis de Lafayette, a distant cousin of Louis XVI. After spending 2 years as an aide-de-camp to Washington, Lafayette returned to France and was instrumental in convincing King Louis to have France enter the war on the side of the revolutionaries (9, p. 398)—an intervention that was ultimately to decide the war in favor of the colonies.

It is surprising how little the topic of Washington's infertility is discussed among historians and the medical community. A literature search identified only one medical article

speculating as to the cause of Washington's infertility (29). This omission is likely due in part to the frequent erroneous assumption that infertility is mostly female in origin. Additionally, there might be reluctance on the part of biographers to discuss Washington's infertility because they fear that discussion of his infertility would diminish him in some way. This, of course, belies the fact that male infertility mostly occurs independent of one's other characteristics and affects the great and the humble without regard to historical stature.

Despite great successes in his military and civilian life and his central role in the creation of the world's most enduring democratic nation, George Washington likely suffered from male infertility and harbored great personal sadness about his inability to father an heir. In my opinion, it seems most likely that his infertility was due to one of history's greatest killers, tuberculosis, which were he alive today could be well treated with medication; furthermore, techniques in assisted reproduction, such as ICSI, could be attempted to address his and Martha's infertility.

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*Acknowledgments:* The author thanks William J. Bremner, M.D., Ph.D., and Alvin M. Matsumoto, M.D., from the University of Washington Departments of Medicine, and Richard Berger, M.D., from the University of Washington Department of Urology for helpful comments and review of the manuscript.

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