

China's first surgeon: Hua Tuo (c. 108–208 AD)

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Abstract Hua Tuo (c. 108–208 AD), the Chinese surgical pioneer and herbal expert, excelled as a physician, making significant strides in anesthesia, surgery, and acupuncture. He is accredited for spearheading the practice of laparotomies and organ transplants, using anesthetics, and he was the first Chinese surgeon to operate on the abdomen including performing splenectomy and colostomy. Neurologically, Hua Tuo is said to have performed procedures to treat headache, paralysis, and suspected a brain tumor in one patient. Tuo's impact on medicine was so profound that the phrases "A Second Hua Tuo" or "Hua Tuo reincarnated" were coined in honor of his diligence and compassion to recognize outstanding physicians who demonstrate an equal caliber of surgical competence. It is the pioneering contributions to medicine and surgery as made by such physicians as Hua Tuo on which we base our current understanding.

Keywords History · Chinese · Surgery

Regarded as China's first surgeon, Hua Tuo (also known as Yuan Hua of Hao county) (Fig. 1) acquired a surgical acumen and a keen understanding of herbal medicine at an early age. Born around AD 108 in the Eastern Han dynasty in present

day Haoxian in Anhui province, Tuo's lofty reputation spread rampantly throughout China, as the public praised his effortless attempts to remedy even the most grueling conditions. As a child, he grew up in poverty but explored various fields, studying astronomy, geography, literature, history, and agriculture. It was not until he was 7 years of age that he accrued a passion for medicine upon witnessing the death of his father [1, 2].

Traveling hundreds of kilometers each day to practice medicine under the guidance of a physician named Cai, Tuo eventually made groundbreaking contributions to the fields of surgery, gynecology, pediatrics, and acupuncture [3]. Among some of Tuo's most notable contributions were anesthetics, suturing, antiseptics, anti-inflammatory crams, and anthelmintics [8]. His knowledge of acupuncture and herbal remedies vastly contributed to his medical success.

Tuo lived humbly, refusing to revel in his fame. He provided equal treatment to all of his patients despite their social class or income and frequently served the elderly and the poor [4]. Although little is known of this "miracle-making doctor," as few of his original works have been reconciled, patients admired Tuo for his empathy during their recovery [1, 12]. Tuo evaluated the symptoms of every patient and treated them accordingly, concocting various medicinal treatments to efficiently remedy their symptoms. He genuinely cared for the wellbeing of his patients and used anesthesia to quell their discomfort during surgery. He maintained postoperative relationships with his patients, often traveling across town to reaffirm their good health [9].

Neurologic cases

Hua Tuo's passion for medicine ultimately led to his demise when General Zao Cao, ruler of the state of Wei during the

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Cover figure Woodblock by the Japanese artist Utagawa Kuniyoshi depicting Hua Tuo operating on General Guan Yu as mentioned in the historical novel the Romance of the Three Kingdoms

Fig. 1 Rendering of Hua Tuo operating the abdomen. Cover figure: Woodblock by the Japanese artist Utagawa Kuniyoshi depicting Hua Tuo operating on General Guan Yu as mentioned in the historical novel the “Romance of the Three Kingdoms”



Three Kingdoms Period, one of his patients, ordered out of spite that he be executed. When the general complained of reoccurring headaches, which some believed were due to a brain tumor, Tuo performed a single session of acupuncture, immediately remedying the general’s symptoms [8, 12]. Following the session, Tuo remained at the general’s court, but he later wished to travel back to his birthplace. Infuriated by Tuo’s decision, Zao Cao ordered that Tuo be executed in 208 AD [8]. Following Tuo’s execution, a collection of 34 acupuncture points, “Hua Tuo Jiaji,” was named in his honor [1, 11]. One of these points includes the areas over the facet joints of the spine.

Walker also recollected a case of Hua Tuo’s in which a lump was removed from between the eyes of a man and may have represented a frontal encephalocele. After incising the tumor, a canary presumably flew out and the itching and headache that had been significant before the operation was now gone. Additionally, according to the Hua Tuo Bei Zhuan (Records of Hua Tuo), a lame man was cured following acupuncture treatment from Hua Tuo.

Other cases

In his biography of Hua Tuo, Chen Shou praised Tuo for his four most noteworthy accomplishments, the first being his interest in herbal remedies. His healthy lifestyle filled with cleansing techniques, ultimately enabled him to remain youthful even at 100 years of age [10]. Thus, Chinese society often regarded him as “immortal” [3]. Shou praised Tuo’s understanding of herbal medicine; Tuo effectively cured his patients with an intricate concoction of herbs, and many of his patients experienced a full recovery. When devising his concoctions, he could accurately estimate the ideal amount of each ingredient without

the use of a scale [10]. Furthermore, Tuo mastered the art of acupuncture and overwhelmed his colleagues with his intricate surgical technique, most notably his use of *ma fei san* as an herbal anesthetic. *Ma fei san* probably included cannabis [7]. Upon drinking the concoction, patients reported little to no pain, enabling Tuo to perform many successful surgeries. In the event of an abdominal surgery, Tuo directed his patient to drink a herbal concoction, and as soon as the patient lost consciousness, Tuo would make his incision. In 4 or 5 days, the patient's pain would ease, and after a month, the patient would regain full health [1, 11]. After only a brief examination, Tuo could accurately evaluate the severity of each of his patient's conditions, providing them with detailed advice on how to recuperate. The patients who listened to Tuo's advice recovered quickly, while those who did not died shortly after the visit. Many people regarded Tuo's abilities as uncanny, as he could predict the fate of his patients based upon their postoperative compliance with his advice [4]. He is said to have performed splenectomies and colostomies [8].

Tuo instilled in his students a passion for medicine, educating them on herbal treatments, acupuncture, and surgical technique. Two of his colleagues, Wu Pu and Fan A, illustrated to the public Tuo's astounding contributions to Chinese medicine [3, 12]. With his compassion, drive, and diligence, Tuo enlightened Wu Pu and Fan A, helping them to further understand the field of medicine.

Tuo introduced Pu to a fitness regimen called "the frolics of the five animals," which he claimed was the secret to his vivacity and long life. In his regimen, Tuo mimicked the movement of five distinct animals including the tiger, deer, bear, monkey, and egret, in an attempt to relieve his pain and gain inner strength and stamina [8, 12]. His regimen later became a notable aspect of Taoism, promoting health and wellness and may even have spearheaded the development of the Chinese martial art *Tai Ji Chuan*.

Fan A, on the other hand, attributed his exceptional acupuncture skills and good health to his mentor, Hua Tuo. Tuo introduced to his colleague a fortifying powder, made from lacquer tree leaves (*qiye*) and beet greens (*qingnian*), which aided in parasite prevention, weight management, and hair discoloration. Sun Simiao, the well-known physician during the Tan dynasty, accredited Tuo's knowledge of *qiye* and *qingnian* in three of his publications. Also, Ge Hong, a physician of the Jin dynasty, accredits Tuo's prescriptions as being the most effective and innovative of his time [12].

Many physicians attribute to Tuo the ability to feel the pulse and evaluate the patient accordingly. Following a miscarriage, a woman approached Tuo, complaining of severe abdominal pain. Upon evaluating the woman's pulse, Tuo diagnosed the woman with a twin pregnancy, solidifying the presence of a dead fetus inside her abdomen. With a mere session of acupuncture, Tuo evoked the stillbirth [1, 3, 11].

Furthermore, Tuo evaluated the position of the fetus to conjecture about the gender of the unborn child [1, 6].

Also, Tuo excelled in the eradication of parasites, which infested the body as a result of the consumption of uncooked meat. Two of Tuo's most noteworthy accounts of parasites included those that restricted the pharynx and induced ulcers [6].

Furthermore, when the lethal epidemic, *Shanghan*, spread rampant in the Eastern Han dynasty, Tuo astounded fellow physicians with his knowledge of the skin, muscles, abdomen, and stomach, curing even the most severe cases of the epidemic [12].

Tuo's other successful procedures included an operation on General Guan Yu's arm wounded by a poisoned arrow in battle [3, 5, 8]. While Tuo operated on the general's arm, the general engaged in a game of chess, an image that



Fig. 2 Hua Tuo

reoccurs in Chinese and Japanese art (cover figure) [3]. Tuo's wisdom of herbal treatments and innovative techniques helped to solidify Wu Pu and Fan A's medical expertise and earned him respect from many of China's most lofty physicians.

Hua Tuo excelled as a physician due to his practicality, compassion, and honesty (Fig. 2). As China's first surgeon and pioneer of acupuncture, Tuo impacted many of his patients, promising them long lives filled with good health. He will forever be remembered for his groundbreaking achievements in the early practice of medicine and is revered as a medicinal immortal by Daoists.

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