

Joseph-Frédéric-Benoît Charrière: Master Cutler and Instrument Designer

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Abstract

Modern surgery owes its development to the innovations and skill of those craftsmen in the early 19th Century. Joseph-Frédéric-Benoît Charrière was a Parisian Cutler of renowned fame. He pioneered many developments in ether administration, urologic and other general surgical instrumentation. He also made profound modifications to the syringe, haemostat and aneurysm clip. Charrière, most importantly, developed the French (Fr) or Charrière (Ch) gauge system used in sizing catheters and endoscopic equipment (1 Charr. = 0.333 mm). His contributions were widespread and are still evident today.

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1. Introduction

Given that the meaning of the word “surgery” is “manual work” it is no surprise that for the medical historian the innovation and development of surgical instruments plays an important role. When we think of medical breakthroughs we must remember that this progress was stepwise, occurred in times of revolution or war and could not be born without ingenuity and innovation.

France was renowned from the early 17th Century for the quality of the surgical instruments produced. Voltaire in his “Siècle de Louis XIV” wrote “not only were the best surgeons to be found in France, but it was also the only country where the necessary instruments were perfectly made” [1]. This strong tradition continued into the 19th Century during which the British were on the crest of the Industrial revolution and Europe prepared for another Napoleonic war.

JFB Charrière was born in 1803 in Cerniat in Gruyere, a district of Fribourg, in Switzerland where

his uncle practised the trade of Cutlery. He was brought up by his grandfather, as his parents were already established in Paris, where his father worked as a bank clerk. He received a basic education up to the age of 13 years but like many young men of the time, he was apprenticed early at this age. He began his career in Paris, France, as an apprentice Cutler making knives and tools. He quickly mastered his art and became a master cutler and owner of his own business four years later. (Fig. 1). His reputation as an expert surgical instrument maker in Paris quickly began to grow amongst local surgeons at the time, of which Guillaume Dupuytren (1777–1839) was a chief surgeon and department head of the Hotel-Dieu Hospital. Dupuytren made Charrière his personal supplier and inspired his genius by bringing him to the hospital each morning to watch his operations and post mortems and the use of his instruments in these procedures.

Charriere designed and produced an impressive array of innovations in surgical practice. He developed fine surgical scissors that opened without the need for a screw and could be quickly disassembled for cleaning. He also developed a precursor to the modern haemostat that worked using a “small system of notches without the surgeons constant application of force”. The early spring clip used in aneurysm surgery was also designed

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Fig. 1. Joseph-Frédéric-Benoît Charrière (1803–1876)—originally appeared in Octave Pasteau, *Les Instruments de chirurgie urinaire en France* (Paris, Boulange), 1914. Courtesy of The New York Academy of Medicine Library.

by Charrière—his strategy of crossing the legs of the forceps was the most important modification of the basic forceps since its invention [2].

He also developed and refined a non-rebreathing system for administering ether anaesthesia. This allowed anaesthesia to be given in a much more controlled way and due to this became much more accepted in France following its initial resistance.

He also modified the traditional materials used to make surgical instruments by the introduction of flexible ivory, nickel silver and tempered steel that resulted in instruments that were more durable and manageable and confirmed his reputation as an innovator. Charrière also made a huge contribution to the medical syringe by double parachuting the stiff leather they were made of in order to make them more flexible and less rigid.

His biggest claim to fame was the development of urological equipment and the Charrière or “French” gauge system is still used today to size urological catheters and instruments. In 1842, Charrière invented this system of measurement that was based on one-third of a millimetre (1 Charr. = 0.333 mm) [3].

At the time the British were using and adapting a system for sizing syringe and suture needles/material and catheters in order to standardise their manufacture of metal wires (the Stub gauge was based upon an existing accepted standard of measurement—the inch) [4].

The Charrière (Ch) of French (Fr) system proved more practical and still remains in use today the world over. It has uniform increments between gauge sizes,

has no upper limit and is easy to convert between its metric equivalents [3]. About the same time, a French physician, Pierre Jules Bénéiqué (1806–1851), designed a lead or tin sound with a wide curve for dilating urethral strictures. He also devised a scale of measurement similar to Charrière except that the size was based on 1/16th of a millimetre instead of 1/3rd. This scale whilst initially also used in Europe never was accepted in the United States as was the Charrière system [5].

Other contributions to urologic surgery include the lithometer (used for measurement of bladder calculi) and several refinements of the transurethral lithotrite developed by another famous Frenchman, Jean Civiale in 1823, which was used to crush urethral and bladder stones. These devices were sold world-wide and allowed reproducible and easy sizing based on the Charrière system (Fig. 2).

For his services and achievements to surgery and the cutlery industry he was awarded a “Chevalier” of the Legion of Honour (“Légion d’honneur”) in 1843 (eight years after he became a French citizen) and was promoted to “officer” in 1853 [6]. He continued to enjoy international success in his trade and was named the Orthotics and Prosthesis supplier by the General Council of Hospitals in France.

He died in 1876 at the age of 73 years. Many of his apprentices still bear their names in modern day surgical parlance (Georges-Guillaume Amatus Lüer, Louis-Joseph Mathieu, Adolphe Collin, Joseph Leiter and Camillus Nyrop) [4].

In 1852 he transferred the management of his company to his son Jean-Jules. Sadly, he outlived both his sons who died from Cholera and so bequeathed his business to two of his pupils, Robert and Collin [1]. Towards the end of 1870 only Adolphe Collin remained in charge of the firm. His grandson, Pierre



Fig. 2. The Charrière signature found engraved on all handmade instruments. Courtesy of Dr. M. Echols, private collection.

Collin and the husband of his granddaughter succeeded him. In 1930 the firm of Collin was taken over by Gentile. In 1978 the auction of the collections of the firms Charrière, Collin and Gentile took place in Paris.

References

- [1] Boschung U. Joseph-Frédéric-Benoît Charrière (1803–1876) fabricant d'instruments de chirurgie parisien originaire de Suisse. *Schweiz Rundschau Med* 1985;74:181–4.
- [2] Louw DF, Asfora WT, Sutherland GR. A brief history of aneurysm clips. *Neurosurg Focus* 2001;11:1–4.
- [3] Iserson KV. JFB Charriere: the man behind the “French” gauge. *J Emerg Med* 1987;5:545–8.
- [4] Iserson KV. The origins of the gauge system for medical equipment. *J Emerg Med* 1987;5:45–8.
- [5] Tucker RA. History of sizing of genitourinary instruments. *Urology* 1982;20:346–9.
- [6] Boschung U. J.-F.-B. Charrière. In: *Les fribourgeois sur la planète—die Freiburger in aller Welt. Historical Dictionary of Switzerland*. Switzerland: Bern; 1987. p. 47–55.

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