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Charles Stent (1807–1885) between innovation and business: a dentist's role in the history of dentistry and surgery

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Abstract. Charles Stent (1807–1885) is remembered for the origin of the word "stent", now widely used in the surgical practice. The real contribution that Charles Stent actually gave to the progress of medicine, mainly of dentistry, is due to his invention of a compound for dental impression called "Stent's composition". This study means to examine the history and the scientific and commercial impact of Stent's composition. To this aim, judicial reports from the early 20th century, very unusual sources for researches in this area, were used. The trademark possession rights of this product were examined in a court of law and the action is still used today as a reference in Anglo-Saxon case law. After a careful reanalysis of the documents, it can be seen that Charles Stent's invention brought about an important technological contribution to dentistry, achieving immediate success among dentists. Many industries began to produce devices similar to Stent's composition. However, the first company that realized the utility of the new compound for dental impressions and bought the trademark from Stent's heirs was Claudius Ash & Son.

Key words: Charles Stent, dentistry, surgical practice, history of medicine

Introduction

Stents are widely used devices in current surgical practice.

The most common example is the coronary stent that brings patency back to the lumen of occluded coronary arteries thus allowing cardiac perfusion (1). The first recorded use of a stent in cardiovascular surgery dates back to 1966, featuring in a study by Weldon and colleagues, while the first coronary implant on a patient took place in Toulose in 1986 (2).

In the medical literature many a study trying to explain the etymology of the word "stent" can be found, yet its origins are still somehow uncertain.

According to Webster's Dictionary, stent is an obsolete or Scottish dialectal form of stint. The Scottish word includes the meanings "to limit" or "to restrain" but also to stretch or straighten.

Morgan & Osborn consulted the Oxford English Dictionary Word and Language Service (OWLS) and traced the word stent to a verb meaning to extend, set or stretch, and to a noun meaning a stake (for stretching fishing nets) (3).

The most accepted version ascribes the genesis of the word to the Dutch plastic surgeon Jan F. Esser (1877-1946). In 1916 he adopted this word to define a composition for dental impression he used to create fillers to be used in reconstructive surgery of the face (2). The use of the word "stent" then gradually spread to different surgical fields, such as the vascular and the urological, indicating the reconstruction of various structures of the body, thus making them functional again.

The mould adopted by Esser was in fact a mould for dental impressions, which had originally been invented in 1857 by the English dentist Charles Stent

(1807-1885), who named it after himself, *Stent's composition* (1).

It seems likely that the word originated with the dentist Stent, as its other uses were the obsolete English and Scottish meanings. Both alternatives would be correct if the Stent family name originated from the old Scottish word, however, the genealogical studies carried out have not shown this (4).

Regardless of the etymological issues described above, perhaps, Charles Stent still deserves to be remembered in the History of Medicine.

With these words Charles Stent presented his invention in his only publication of 1859:

> "As there is much difficulty experienced in obtaining a perfect bite in cases where entire sets of artificial teeth are required, as well as in articulating sets of teeth out of the mouth, I have the pleasure to offer to the Profession a plan which I have found most efficient. In the first place I obtain perfect impressions of the upper and lower alveolar ridges, for which purpose I use the improved white plastic compound lately introduced by me to the Profession, which sets in the mouth in a minute or two, so that it can be removed without injury to the impression; or my new "wax and gutta-percha composition." Either of these preparations I believe to be superior to anything of the kind hitherto employed (5)".

However was the Stent's Composition really a material that revolutionized the dental practice?

The aim of this research is to re-examine Stent's real historical impact on the worlds on dentistry and surgery and clearly define the boundaries of his scientific legacy.

Materials and Methods

To understand the relevance of Stent's invention, very unusual sources for researches in this area were used.

In England, Stent's composition was the object of a classical judicial debate on trademark ownership rights. As a matter of fact, this case is still being studied and used as a reference in Anglo-Saxon case law. The original judicial reports published on *Reports of Patent, Design and Trade Mark Cases* (the leading full-text law reports in intellectual property) and *The chemist and druggist* (the leading trade journal for the pharmacy community in the UK) between 1911 and 1912, together with primary historical sources, have been examined and contextualized using the historico-medical lens.

Results

Following its introduction into the market, Stent's composition achieved sale success and was recommended by the most famous dentists and became known as "Stent's Impression-composition" or was very often referred to as "Stent's composition". It was sold in tablets. Charles Stent was employed in his business with his two sons Robert (1845-1901) and Arthur (1849-1900). In 1885 the father died, and the company passed to his widow, Caroline Stent, who carried it on with the help of her sons. In 1898 Mrs. Stent, who had registered the trademark, appointed as her sole agents for the sale of the composition a company called Claudius Ash & Sons, Ltd. In 1905 that company, amalgamating with the firm Ash & Co., went to form Claudius Ash, Sons & Co., Ltd. In 1906, her two sons having died, Mrs. Stent sold her business and trademark to Ash (6). "Claudius Ash and Son" started their activity in the field of dental technology around 1820, when Claudius Ash (1792-1854), a goldsmith of Westminster, was asked to apply his skills to make a number of dental prostheses. Originally based in Broad Street (now Broadwick Street, London) the company expanded rapidly (7). After the birth of the era of vulcanite, Ash's firm started an early production and supply of dental gums, in 1857 (8). The latest example is the new design of pliers that Ash's firm introduced, and that is still sold today (9).

In August 1910 Claudius Ash, Sons & Co. became aware that the Invicta Manufacturing Factory were selling a composition similar to the one they had purchased and produced under the name "G. Stent's composition". Ash began an action against the Invicta

accusing them of unfair competition and infringement of trademark, having no right to the use of the name " Stent's" and because of the similarity of their product. On their part, the Invicta defended their products by saying that the employment of the word "Stent's" in dental practice was commonly used to refer to the product that Ash traded. Some witnesses working in dental industry argued that "Stent's composition" meant throughout the Ash composition, and that no other composition was known as "Stent's". During the trial, Mr. W.H. Stent, a nephew of Mr. Charles Stent, said that he did not know any of his family whose name began with "G." Mr. William Edward Gaunez, manager of the Invicta manufacturing, declared in court that he had already begun his production of dental composition with his partner DA Roberts in 1892, and that Claudius Ash, Sons & Co were certainly aware of the fact (10). They carried on business in the neighbourhood of New North Road as Edwards & Co. As evidence of this they showed a prescription for the production of a dental composition: it was associated with the name of "G. Stent's." Also the mould for the manufacturing of the composition was made in 1892. Then Gaunez had been on business with Mr. Robert Tanner as Tanner & Co. Eventually, the business transferred to Old Charlton, where they had been taken over by the Invicta manufacturing (11). Mr. Higson, Ash's director, testified that Mr. William Edward Gaunez wanted to buy Mrs. Caroline Stent's activity and he had entered into negotiations with her. After the meeting, Gaunez told Mr. Higson that the lady asked 5,000 pounds for the business of Stent's composition. Mr. Higson had replied to her that it was a big deal, but Invicta's President was not of the same opinion, stating that the formulae for these compositions were public property.

On March 9, 1911, Ash won the action of first instance. On May 21, 1911, the Court of Appeal overturned the judgment (12). The House of Lords, on May 9, finally decided that it was an issue to be resolved on the basis of the evidence, and in their opinion the decision of the Court of Appeal was correct.

> "No one seemed to have been deceived, and had not been proven that the defendant acted dishonestly or that there was an intention to deceive (13)".

In 1921, Ash wrote in the book "A Century of Dental Art: A Centenary Memoir":

> "... sometimes the impression materials, which have not got the right to be called "stent's "are loosely described as such. For many years Ash trading house has been the only producer and owner of the property rights of genuine Stent's Impression-composition (14)".

The judicial reports, in fact, inform us that during the trial many other companies of a similar composition came out (9):

"Walsh Stent's compositions", sold by A.B. Walsh & Co. at 96 Great Portland Street, London; "Savage Stent s", sold by J.Savage at 203 Camberwell New Road, London; "W. Stent's" of Ward Bros, dental instrument manufacturers, at Kentish Town Road; "H. G. Stent's composition", produced by a company in the province and sold by C. De Trey & Co. of Denman Street, Shaftesbury Avenue. It also appeared that Horatio C. Stent - a son of Robert's and a grandson of Charles Stent's - began to make a composition of a type similar to the one built by his grandfather, before 1898, while he was at the Therapeutic Dental Service Company and in 1899 he registered the "HC Stent" brand (15, 16). Still today the Schottlander Company sells "H.C. Stent" composition.

Discussion

The procedure of stenting has substantially changed available surgical options allowing the establishment of novel procedures such as repair of endovascular aneurisms, coronary angioplasty or biliary drainage. While the word "stent" currently used today likely only rather indirectly refers to the Charles Stent, by re-examining the facts reported in the chronicles, primarily the heated judicial debates, it can be clearly seen how precociously the name "Stent" managed to rise to prominence both in the field of dental and medical practice, immediately following Charles Stent's invention and commercialisation of his dental composition.

The reason for this resounding success are to be found in the flaws of the materials normally used in dental practice before Stent's invention. In the nineteenth century the main materials for dental impression were beeswax and Paris plaster. Both had inherent weaknesses: wax got distorted after removal from the mouth and plaster was very difficult to use. In 1847, the British dentist Edwin Truman (1819-1905) introduced the gutta-percha as a material for print taking, but it was unsatisfactory as it distorted upon removal from the mouth and narrowed during hardening (1). As highlighted above, the breakthrough came instead in 1857, when Charles Thomas Stent, a London-bases dentist, added several other materials to the gutta-percha, notably stearine, a glyceride of stearic acid, palmitic acid, oleic acid, and a substance derived from animal fat that markedly improved the plasticity of the material as well as its stability. He also added talc, as an inert filler to give more body to the material, as well as red colouring (2). This signified a ramarkable technological advancement.

At the beginning of the 21st century, other technological advances have been made in the field of dental impression materials. The short but enlightened work *"Greene Brothers clinical course in dental prostheses in three printed Conferences"*, produced in 1910, represented a point of reference for dentists who wanted to learn the technique for dental impression. In the manual, the Greene brothers, Peter Thomas and Jacob Wesley of Chillieothe (Missouri) described the impression technique of the closed-mouth composition using a material produced by the Detroit Dental Manufacturing Company in 1897 (17), the *Kerr "perfection" impression compound* (18). This compound was presented as the best, which is more explicitly stated in *"Greene System of advance test methods in impression taking with Kerr Perfection Impression Compound"* (19). Both books were published by the Detroit Dental Manufacturing Company. Despite the influence these publications have had on dental practice, Stent Composition has continued to be among the most widely used products for many decades.

In addition, the subsequent cause of Ash's firm and the Invicta provides important insights into the evolution of dentistry. Claudius Ash, Sons & Co proved to be a company able to invest in innovation and research ahead of its times, first recognizing the value of inventions and discoveries that have shaped the history of dentistry. The success and achievement of Claudius Ash, Sons & Co is certainly partly due to their geographical origin. The company was founded in London, the birthplace of several dental innovations, and has expanded throughout the territory of the vast British Empire, reaching a global spread.

The herein analyzed judicial reports show that, more than fifty years after his invention, the interest generated by Charles Stent's composition was still alive and well and was about to pave the way for a major industrial output. Indeed, the explosive combination of an ingenious invention and empire-fuelled trading advantages, clearly indicate how Charles Stent gave a valuable contribution to the technological development of dentistry.

Conclusion

The heated judicial case between different companies competing for trading rights on his dental composition highlight once more and even more powerfully the impact and the role played by the British dentist Charles Stent in the advancement of dental and medical sciences.

His invention was greeted with great enthusiasm by dentists and they really preferred it to other dental impression compositions, because it allowed a more precise mold.

Nevertheless, it also appears clear as the evolution of medicine and its techniques, especially in the modern world, is not only the result of the outstanding discovery attributable to eminent scientists, yet the translation of such innovations into ordinary clinical practice is indissolubly intertwined with a commecial vision applied to a global scale, often the result of advantages nations (in this case Britain) profiting from faster and better communication routes.

In addition, the judicial chronicles offer food for thought about the etymology of stent, proving the passages that led the Stent surname to become a colloquial name. In fact Charles Stent, giving his surname to his invention, transformed it into the proper name of dental impression material: Stent's Composition.

From the legal proceeding between Ash and Invicta Manufacturing it emerges that within a few years stent's composition become a colloquial name for a certain type of composition having the characteristics of that invented by Charles Stent.

Therefore, in any case, it was not the plastic surgeon Esser who transformed the Stent surname into a colloquial name.

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References

1. Ring ME. How a Dentist's Name Became a Synonym for a Life-saving Device: The Story of Dr. Charles Stent. J Hist Dent 2001; 49:79-80.
2. Roguin A. Stent: the man and word behind the coronary metal prosthesis. Circ Cardiovasc Interv 2011; 4(2): 206-9.
3. Hedin M. The origin of the word stent. Acta Radiol 1997; 38:937-9.
4. Peters T, Bairsto R, Gelbier S. The Brompton Cemetery: Charles Thomas Stent and Family and the Development of Stents. Dent Hist 2017; 62(2):74-80
5. C. Stent, A new articulating and bite frame, Dental Review 1859; 1:82-3.
6. Anonymus, Stent's impression-composition. The chemist and druggist 1911; 78:345-6.
7. Claudius Ash, sons & co., ltd. A Centenary Memoir, 1820-1921. London: Claudius Ash, sons & co., ltd.; 1921: 4.
8. Claudius Ash, sons & co., ltd. A Centenary Memoir, 1820-1921. London: Claudius Ash, sons & co., ltd.; 1921: 47.
9. Al-Musawi A. Armamentarium for basic procedures. In: An-dersson L, Kahnberg KE, Pogrel MA (eds) Oral and Max-illofacial Surgery 2nd ed. Wiley-Blackwell; 2012: 137-44.
10. Anonymus, Stent's impression-composition. The chemist and druggist 1911; 78:345-6.
11. Anonymus, Stent's impression-composition. The chemist and druggist 1911; 78:345-6.
12. Anonymus, Stent's Dental Composition. The chemist and druggist 1911; 78:776.
13. Anonymus, Stent's Composition. The chemist and druggist 1912; 80:669.
14. Claudius Ash, sons & co., ltd. A Centenary Memoir, 1820-1921. London: Claudius Ash, sons & co., ltd.; 1921: 14.
15. Claudius Ash, Sons & Co. Ld. V. Invicta Manufacturing Company Ld. Reports of Patent, Design and Trade Mark Cases 1911; 28(26):597-611. https://doi.org/10.1093/rpc/28.26.597
16. Claudius Ash, Sons & Co. Ld. V. Invicta Manufacturing Company Ld. Reports of Patent, Design and Trade Mark Cases 1912; 29(21):465-76. https://doi.org/10.1093/rpc/29.21.465
17. Ward G. Impression materials and impression taking: an historical survey. Br Dent J 1961; 110:118-9.
18. Greene JW. Greene brothers' clinical course in dental prosthesis in three printed lectures : new and advanced-test methods in impression, articulation, occlusion, roofless dentures, refits and renewals. Chillicohte, Mo.: Detroit Dental Manufacturing; 1910.
19. Greene JW. Greene System of advance test methods in impression taking with Kerr Perfection Impression Compound. Detroit: Detroit Dental Manufacturing; 1916.

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