

Gaspare Tagliacozzi, pioneer of plastic surgery and the spread of his technique throughout Europe in “De Curtorum Chirurgia per Insitionem”

P. TOMBA, A. VIGANÒ, P. RUGGIERI, A. GASBARRINI

Rizzoli Orthopaedic Institute, Bologna, Italy

Abstract. – Gaspare Tagliacozzi’s innovative surgical technique, which consisted of reconstructing parts of the face by grafting, was masterfully described in the work that made him famous, “De Curtorum Chirurgia per Insitionem.” It was published by Gaspare Bindoni the Younger in 1597 in Venice, who was granted the exclusive right to print it by the Senate.

However, in the same year in Venice Roberto Meietti published an unauthorized edition; nevertheless, this edition was soon discovered.

The great demand for the text even abroad was soon testified by a 3rd edition published in Frankfurt in 1598, similar to the Bindoni edition but in another format and with a different title. This has caused confusion among bibliographers and Authors. Two centuries later, in 1831 in Berlin, a 4th edition was printed, thus suggesting renewed interest in rhinoplasty procedures, which surgeons Van Graefe and Dieffenbach promoted in Germany.

However, few people know that the integral text of Tagliacozzi’s *De Curtorum* was also published by Jacques Manget in his “*Bibliotheca Chirurgica*,” printed in Venice in 1721.

The name of the illustrator of the three fourteenth-century editions, whose illustrations in the text are compared, is not known. Instead the name of the artist, Tiburzio Passerotti, who painted Tagliacozzi’s portrait holding his *De Curtorum* open at the ninth woodcut shortly before it was printed, is well known.

The impact of Tagliacozzi’s technique on modern surgery is supported by experience of the last century as well as recent years, mostly in musculoskeletal oncology reconstruction.

Key Words

Tagliacozzi’s technique, Rhinoplasty, Plastic surgery.

Introduction

The University of Bologna has long been famous for its distinguished academics in the field of medicine: indeed, Mondino de’ Liuzzi was ac-

tually born in Bologna¹, where he made his first public demonstration on the human body and wrote in 1316 what was to be the first “mise-en-texte” of anatomy².

About 250 years later, again in Bologna, another illustrious doctor was born, who is credited with founding plastic surgery on a scientific basis, which until then had been performed empirically³; Gaspare Tagliacozzi taught surgery in his Bolognese Studio until 1589 and the theory of medicine, together with anatomy, up to the year of his death in 1599.

He learned the technique of facial plastic surgery from his teacher Giulio Cesare Aranzi⁴, professor of surgery and anatomy at Bologna University, who in 1570, managed to separate the chair of ordinary anatomy from that of surgery.

Since Tagliacozzi had been a great innovator, many historians have focused on him, although not all of them have always agreed on the date of his birth and death. These contradictions prompted two great scholars, Jerome Pierce Webster⁵ and Martha Teach Gnudi⁶ to investigate the life of this Bolognese surgeon through careful research which resulted in the hefty volume they published in 1950 entitled “The life and times of Gaspare Tagliacozzi”.

Tagliacozzi’s work was so important that, during the funeral mass celebrated in his honour, his colleague Muzio Piacentini ended the eulogy by repeating the epitaph written on the grave of one of the greatest painters of the Italian Renaissance, Raffaello Sanzio, buried in the Pantheon in Rome. It reads: “Ille hic est Raphael timuit quo sospite vinci rerum magna parens et moriente mori” (Here lies Raffaello. Mother Nature feared being surpassed by him while he was alive and feared dying with him when he died), meaning that nature feared being beaten by them but, once dead, the same nature feared becoming extinct because no-one was able to reproduce her so perfectly as they did⁷.

Tagliacozzi's innovative surgical technique, which consisted of reconstructing parts of the face (in particular the nose, but also the lip and ear) by grafting, was masterfully described in the book that made him famous, "*De curtorum chirurgia per Insitionem*", printed in 1597. His method is known throughout the world as the "Tagliacozzi" or "Italian method."

In brief, to reconstruct the nose, the surgeon lifted a skin flap of the patient's arm and sutured it to the nasal region, which was then immobilized with the arm on the head until the skin took root on the nose, i.e. for about three weeks (Figure 1). The flap was then separated from the arm and molded onto the nose, thanks partially to the help of nasal covers, as shown in the figures, to give the nose a regular size and shape.

"*De Curtorum Chirurgia per Insitionem*" marked the climax of a long period of study and experience and drafting it cost the Bolognese surgeon several years of fatigue, which he had already partially written in 1586 when he sent a famous letter to Mercuriale⁸ where he described the method he used. The letter was published in the second edition of "*De Decoratione*" by Mercuriale, printed in 1587.

It is not known whether Vincenzo Gonzaga, Duke of Mantua and Monferrato, who the work is dedicated to⁹, gave Tagliacozzi financial help for this expensive undertaking. We know for certain that this work was printed in Venice by Gaspare Bindoni the Younger in 1597¹⁰, after which the right to print was granted by the Senate on condition that no-one other than Bindoni could print Tagliacozzi's text.



Figure 1. Gaspare Tagliacozzi, *De Curtorum Chirurgia per Insitionem*. Venezia, Roberto Meietti, 1597, tab. VIII. Bologna, Putti's Donation, Rizzoli Orthopaedic Institute.

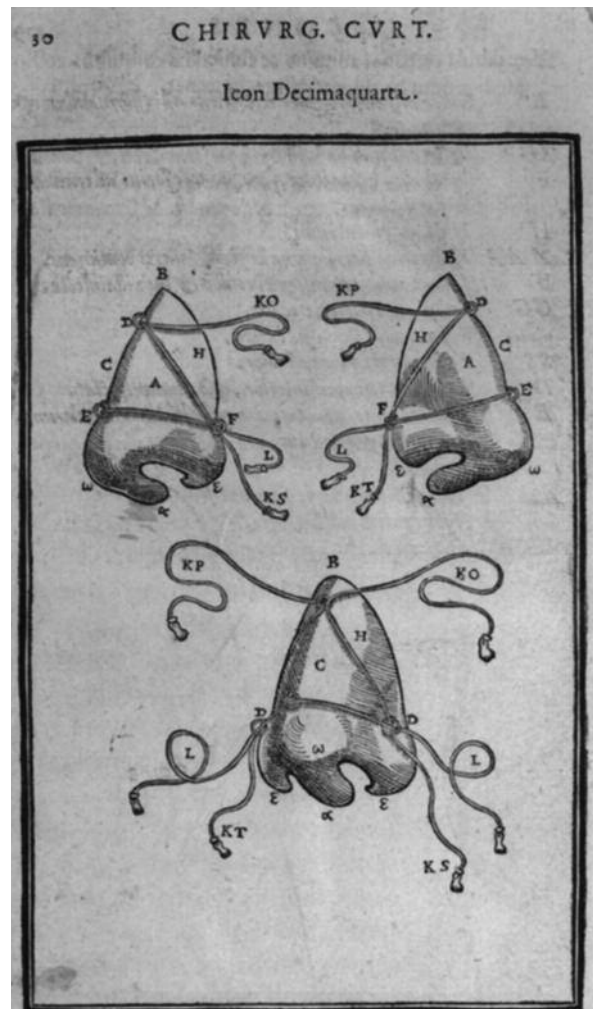


Figure 2. Gaspare Tagliacozzi, *De Curtorum Chirurgia per Insitionem*. Venezia, Roberto Meietti, 1597, tab. XIV. Bologna, Putti's Donation, Rizzoli Orthopaedic Institute.

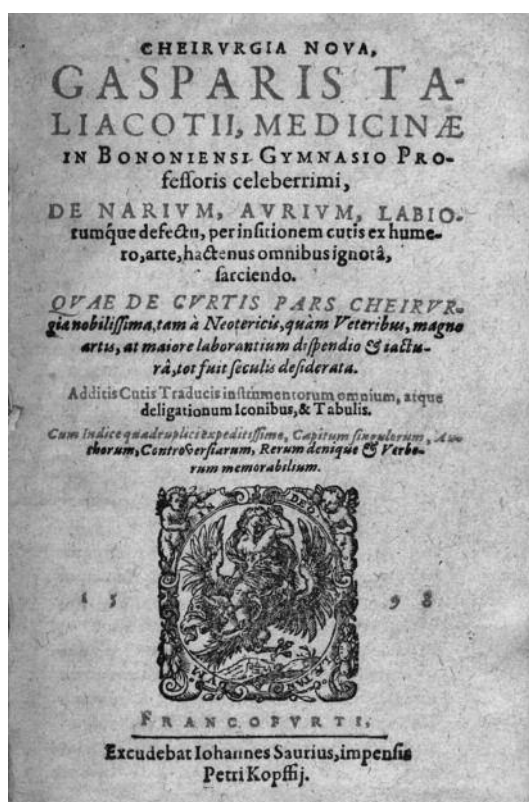


Figure 3. Gaspare Tagliacozzi, *Chirurgia nova de narium, aurium, labiorumque defectu...* Francofurti, Johannes Saurius, title page. Bologna, Putti's Donation, Rizzoli Orthopaedic Institute.

However, in the same year Roberto Meietti of Venice published an unauthorized edition¹¹; The book's success might have prompted Meietti to publish this unauthorized edition as quickly and cheaply as possible, but he was found out fairly soon, which prevented a wide-scale spread of the book which, even now, is far rarer than the Bindoni edition.

But Tagliacozzi's fame was not only local or national¹². In fact, the high demand for his text even abroad was testified by a third edition, in the octavo format, published in Frankfurt¹³. It was printed in 1598 by Johann Saur and financed by Peter Kopff, citizen and bookseller of Frankfurt. The frontispiece in black and red characters shows a different title from that of the Bindoni edition (*Chirurgia nova de narium, aurium, labiorumque defectu.*) which caused confusion among bibliographers and writers because some of them thought it was a different work from "De Curto- rum" of 1597. The Saur brand shows the figure of a man riding an eagle and bears the words "In Deo Laetandum" (Figure 3)

The fourth and final edition was published over two centuries later, suggesting renewed interest in the rhinoplasty procedure advocated by surgeons Van Graefe and Dieffenbach in Germany. These editions, again in-8°, came out in Berlin in 1831, revised and edited by Maximilian Troschel¹⁴ and dedicated to Johann Friedrich Dieffenbach¹⁵. The title returned to being the original one of 1597. Six folded tables each contain different lithographs reduced with respect to the illustrations of the first edition.

But the interest in Europe concerning Tagliacozzi's text is further shown by a complete reprint, with selected illustrations that appear on a single page (Figure 4) and included by Jacques Manget¹⁶ in his *Bibliotheca Chirurgica* of 1721. This text, for reasons unknown, appeared in Geneva in the same year with the brand of two different publishers, Gabriel de Tournes & Filiorum as well as Cramer, Perachon and Cramer Filiorum, both in four volumes.



Figure 4. Jean Jacques Manget, *Bibliotheca Chirurgica*. Ginevra, Gabriel de Tournes, 1721, tab. XVI. Bologna, Putti's Donation, Rizzoli Orthopaedic Institute.

Tagliacozzi's fame and surgical technique soon spread throughout Italy and abroad. In the Italian peninsula. In fact, several important people of his time required his services: Vincenzo Gonzaga, Duke of Mantua; Ranuccio Farnese, Duke of Parma; Ferdinando de' Medici, Grand Duke of Tuscany.

Abroad Tagliacozzi became famous even among those outside the medical field to the point that Heinrich von Pflaumern, a seventeenth-century German writer who was the Author of the famous *Mercurio Italico*, one of the best known and richest guides of Italy of the XVII century¹⁷, pointed out to travellers the inscription dedicated to Tagliacozzi, located in the first Bologna University building of the Archiginnasio, as the most memorable in this place. To highlight the importance of this surgeon, it is placed immediately after stems of illustrious men such as those of the papal legate Carlo Borromeo and Pope Pius IV de' Medici.

Even the man considered to be the father of German surgery, Wilhelm Fabry von Hilden¹⁸ spoke highly of the Bolognese surgeon and cited him in his text "*Observationem et curationum chirurgicam centuria tertia*"¹⁹. Von Hilden described the circumstances of a rhinoplasty operation performed in Lausanne in 1592 by his teacher Jean Griffon, a Swiss surgeon who moved from Geneva to Lausanne in 1592, and stated that, although Griffon had never seen the Bolognese surgeon operate, he was however able to perform an operation on a girl whose face had been disfigured by a group of brutal soldiers²⁰, by a description of the operation made by a traveller who had been a patient of Tagliacozzi in Bologna. Probably Griffon was so impressed by the result that in this patient he saw that he wanted to try the same method on the disfigured girl.

Griffon surely could not have read the "*De Curtorum*" to perfect this technique, because the first edition of this text was printed five years after the operation in Lausanne, but it cannot be excluded that Griffon had got his hands on the text where, in 1587, *Mercuriale* published the letter where Tagliacozzi described the method he used in detail.

Analyzing the three sixteenth-century editions of the *De Curtorum* (the two printed in Venice in 1597 and the other one printed in Frankfurt in 1598), reveals some clear differences.

The Bindoni edition, in folio format, has a chalcographic frontispiece in an architectonic frame depicting the figures of the two men who made medical science great on the sides: the "divine Hippocrates" and the "very wise Galen".

Both the Bindoni and Meietti editions are in fo-

lio format but the overall look of the unauthorized edition is far less important compared to the Bindoni edition, because it is printed on thinner paper for economic reasons and has smaller characters, narrower margins and more cramped pages. Because of the rush to print the Meietti edition, it is no surprise to find the same layout errors of the Bindoni edition, who numbered page 8 as page 6.

The tables of all three volumes are representative both of the surgical instruments and the people who, wearing clothes of the time, act as models showing the innovative technique. In fact, in all three editions, the book includes a collection of 22 full-page woodcut tables, showing the surgical instruments used for the operations as well as the sequence of phases to follow in the reconstruction procedure.

In the Meietti edition, the woodcuts are made less skillfully and with less attention to detail, especially in the backgrounds, certainly due to the rush in making them.

The last pictures, which show patients treated surgically but represented in an old style, are presented a bit differently in the German edition, which is certainly characterized by the influence nordic art, as shown by the nordic and more marked features of the patients (Figure 5).

Unfortunately, the name of the illustrator is not known in any of these editions because the author did not mention them. This was quite normal practice in illustrated medical books of the sixteenth century, to the extent that even the illustrator of the most famous sixteenth-century book of anatomy, "*De Humani Corporis Fabrica*" by Andrea Vesalio, is not cited in the text, although the name that crops up most insistently is that of Jan Stephan Von Calcar, a pupil of Titian²¹.

Instead, we do know the name of the artist of the oil painting of Tagliacozzi holding a copy of his "*De Curtorum*" (Figure 6): it was Tiburzio Passerotti, a famous Bolognese painter whom in his will Tagliacozzi called "the most excellent of painters"²².

The painting, which can be admired in the "Putti Donation" of the Rizzoli Orthopedic Institute of Bologna²³, for the first time shows the text of plastic surgery, still in manuscript form, which Tagliacozzi would have probably had printed soon after. It can be supposed that it was a kind of advertisement of the time because the index finger of the surgeon's right hand is indicating proudly an open copy on the ninth woodcut of the book, supported by his left hand in a way that is well visible. Behind the chair the Bolognese surgeon is sitting on several copies of the closed



Figure 5. Gaspare Tagliacozzi, *Chirurgia nova de narium, aurium, labiorumque defectu...* Francofurti, Johannes Saurius, tab. XIV. Bologna, Putti's Donation, Rizzoli Orthopaedic Institute.

book can be seen, capped by another open one showing the eighth incision.

At the end of the sixteenth century, as anatomy and surgery were making progress, Tagliacozzi can be considered as a fundamental figure because, in this period of “renaissance”²⁴ when man and his beauty were at the center of the world, through his very important treatise, he managed to spread a technique that was both functional and aesthetic²⁵ and was fundamental for reconstructing the missing parts of those who, through duels, battles or diseases, would have been condemned, without his work, to a lifetime of dreadful disfigurement.

The impact of Tagliacozzi's technique on modern surgery is supported by experience and papers of the last century as well as recent years.

Louis Ombredanne (1871-1956), the elder statesman of continental orthopaedics²⁶ during the first half of 20th century he also performed recon-

struction surgery using flaps²⁷. He was especially interested in nasal reconstruction as testified by his paper: “Rhinoplasty” in 1904 where he wrote:

“There are three methods for nasal reconstruction: The Indian Method of taking a flap from the forehead, the French Method of the sliding flaps taken from the neighbouring tissues of the face, and the Italian Method of taking a flap from the arm or forearm. Next came the combined procedure using both flaps and some material for support, which could be metallic or organic as well as bone or cartilage”²⁵.

Currently new techniques used widely in musculoskeletal oncology reconstruction may be considered as descendants of Tagliacozzi's technique.

In fact, only for the nose and in the facial area, free flaps possibly in association with foreign material to provide structural support either marlex or goretex meshes are being more widely used in oncologic reconstruction.

These types of free flap reconstruction are not only required after wide removal of soft tissue sarcomas in any anatomical site, (most frequently the limbs) but also used to provide adequate soft tissue coverage in limb reconstruction achieved either by modular prostheses or allograft or a combination of the two (allograft prostheses composites)²⁸.



Figure 6. Tiburzio Passerotti, Gaspare Tagliacozzi's portrait. Bologna, Putti's Donation, Rizzoli Orthopaedic Institute.

The efficacy of free flaps is remarkable for preventing the revision of the risk of infections in major skeletal reconstructions and sometimes useful for a safe reattachment of tendons and muscles to the prostheses, especially in proximal tibia reconstruction²⁹.

In surgery of soft tissue sarcomas free flap reconstructions are a major contributing factor to the decrease in the indication for ablative surgery³⁰.

Finally, all these acknowledgments reported over the recent decades support the relevance and value of Gaspare Tagliacozzi's work, who really has to be regarded as a pioneer in the field of plastic surgery.

Acknowledgements

All images in his article are courtesy of the Umberto I Library, which owns all original copies of the books. Authors also thank Liliana Draghetti from Umberto I library for her help. We thank Fondazione per la Ricerca in Medicina.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

References

- GIORGI PP. Mondino de' Liuzzi da Bologna e la nascita dell'anatomia moderna. In: Olmi G. (ed.). Rappresentare il corpo: arte e anatomia da Leonardo all'Illuminismo. Bologna: Bononia University Press, 2004: pp. 3-17.
- CRIVELLATO E, RIBATTI D. Mondino de' Liuzzi and his Anothomia: a milestone in the development of modern anatomy. *Clin Anat* 2006; 19: 581-587.
- SANTONI-RUGIU P, MAZZOLA R. Leonardo Fioravanti (1517-1588): a barber-surgeon who influenced the development of reconstructive surgery. *Plast Reconstr Surg* 1997; 99: 570-575.
- GURUNLUOGLU R, GURUNLUOGLU A. Giulio Cesare Aran- tius (1530-1589): a surgeon and anatomist: his role in nasal reconstruction and influence on Gaspare Tagliacozzi. *Ann Plast Surg* 2008; 15: 717-722.
- FOO RC, WIDMANN WD, HARDY MA. Jerome P. Webster, MD (1888-1974). *Curr Surg* 2006; 63: 27-30.
- DARLING L. Martha Teach Gnu- di 1908-1976. *Bull Med Libr Assoc* 1976; 64: 453-454.
- FORNI GG. L'insegnamento della chirurgia nello studio di Bologna dalle origini a tutto il secolo XIX. Bologna: Cappelli Editore, 1948.
- WEBSTER JP, GNUDI MT. The life and times of Gas- pare Tagliacozzi. New York: Reichner, 1950.
- FRANCHINI DA, TELLINA PERINI C, ZANCA A, MARGONARI R, OLMI G, SIGNORINI R. La scienza a corte: Collezionismo eclettico, natura e immagine a Mantova fra Ri- nascimento e Manierismo. Roma: Bulzoni, 1979.
- TAGLIACOZZI G. De curtorum chirurgia per insitionem. Venezia: Gaspare Bindoni il Giovane, 1597.
- TAGLIACOZZI G. De curtorum chirurgia per insi- tionem. Venezia: Roberto Meietti, 1597.
- SOTO-MIRANDA MA, ROMERO-Y-HUESCA A, GONÉ-FERNÁN- DEZ A, SOTO-GONZALEZ J. Tagliacozzi: no solo curu- jano plastico. *Gac Med Mex* 2006; 142: 423-429.
- TAGLIACOZZI G. Chirurgia nova de Narium, Aurium, Labiorumque Dfectu, per Insitionem Cutis ex Humeris arte hactenus ignota sarciendo. Franco- forti, Johan Saur, 1598.
- TAGLIACOZZI G. De Curtorum Chirurgia - Troschel M, (re-edited.) Berlin: Reimer, 1831.
- MULLER FE. Johann Friedrich Dieffenbach und sein Einfluss auf die Entwicklung der Plastischen Chirurgie. *Handchir Mikrochir Plast Chir* 2008; 40: 279-281.
- PORTMANN ML. Jean Jacques Manget (1652-1742) of Geneve, physician, writer and collector. *Ges- nerus* 1975; 32: 147-152.
- ROVERSI G. Viaggiatori stranieri a Bologna, impres- sioni d'autore dal '500 al '900. Bologna: l'In- chiestro Blu, 1994.
- HOFFMANN KF. Wilhelm Fabry von Hilden, called Fabricius Hildanus (1560-1634) the founder of clini- cal surgery. *Med Monatsschrift* 1960; 14: 391-394.
- HILDANUS GF. Opera Omnia. Francofurti: Joannis Beyert, 1646.
- MONGA L. Odeporica e medicina: i viaggiatori del cinquecento e la rinoplastica. *Italica* 1992; 69: 378-393.
- GUERRA F. The identify of the artists involved in Vesal- ius's Fabrica 1543. *Med Hist* 1969; 13: 37-50.
- GNUDI MT, WEBSTER JP. The life and times of Gas- pare Tagliacozzi surgeon of Bologna. New York: H. Reichner, 1950: p. 430.
- WEBSTER JP. Some portrayals of Gaspare Taglia- cozzi. *Plast Reconstr Surg*. 1968;41:411-26.
- ZIMBLER MS. Gaspare Tagliacozzi (1545-1599): re- naissance surgeon. *Arch Facial Plast Surg* 2001; 3: 283-284.
- WHITAKER IS, KAROO RO, SPYROU G, FENTON OM. The birth of plastic surgery: the story of nasal reconstruc- tion from the Edwin Smith Papyrus to the twenty-first century. *Plast Reconstr Surg* 2007; 120: 327-336.
- PLATT H. Orthopedics in continental Europe 1900- 1950. *J Bone Joint Surg Br* 1950; 32B: 570-586.
- TEIMOURIAN B, ADHAM MN. Louis Ombredanne and the origine of muscle flap use for immediate breast mound reconstruction. *Plast Reconstr Surg* 1983; 72: 905-910.
- MASTORAKOS DP, DISA JJ, ATHANASIAN E, BOLANDP, HEALEY JH, CORDEIRO PG. Soft-tissue flap coverage maximizes limb salvage after allograft bone ex- tremity reconstruction *Plast Reconstr Surg* 2002; 109: 1567-1573.
- MANFRINI M, CAPANNA R, CALDORA P, GAIANI L. Gastroc- nemius flaps in the surgical treatment of sarcomas of the knee *Chir Organi Mov* 1993; 78: 95-104.
- HOHENBERGER P, ALLENBERG JR, SCHLAG PM, RE- ICHARDT P. Results of surgery and multimodal ther- apy for patients with soft tissue sarcoma invading to vascular structures. *Cancer* 1999; 85: 396-408.