Maria Siemionow

FACE TO FACE

A Short History of Face Transplantation

Face to Face

Maria Siemionow

Face to Face

A Short History of Face Transplantation

Springer

Maria Siemionow
Department of Orthopaedics
University of Illinois at Chicago
Chicago, IL
USA

ISBN 978-3-030-06054-1 ISBN 978-3-030-06055-8 (eBook)
https://doi.org/10.1007/978-3-030-06055-8

Library of Congress Control Number: 2018967704

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

When we look into a mirror, we assign an identity to the reflection, and that identity carries a great deal of weight. The reflection says this is a young person or an aging person, a successful person, a person with a goal, a person someone can love. Or perhaps this is someone whose visage is so scarred and distorted that even self-love seems impossible. – From the Introduction

In December 2008, Dr. Maria Siemionow made history by leading the team that performed the first near-total face transplant in the United States—an event that transfixed the medical and nonmedical communities alike for its surgical, emotional, ethical, and philosophical significance.

While transplantation is a daily occurrence around the world, there was something special about this milestone. As Dr. Siemionow says, "You need a face to face the world."

In *Face to Face*, the Polish-born surgeon recounts her 30-year journey to the forefront of American medicine. She describes in detail the events, influences, and patients who informed her passion and fueled her determination.

Dr. Siemionow shares her excitement and her trepidation as she reveals what it takes to strategize against the masterful army that is the immune system, as well as the complex process of identifying a transplant candidate. *Face to Face* provides a fascinating look at the path Dr. Siemionow and her team followed leading up surgery.

Chicago, IL, USA — Maria Siemionow

Introduction

Look in the mirror. You see your face, sleepy in the morning, tired in the evening, capable of a thousand emotions—one or more for every experience, every encounter. Desire. Weariness. Irritation. Happiness. Sadness. Resignation. Joy. Even thoughts are reflected by a flicker here, a shift there. No other aspect of our anatomy is capable of even a fraction of the complexity of motion and emotion allowed by the muscles and tissues of the face.

The surface of the face has as many as 27 different landmarks on each side that give it character and help identify structures such as nerves and blood vessels that lie underneath. If you placed your fingertip in the middle of your upper lip and traced halfway around your mouth to the skin between your lower lip and chin, you would have crossed ten different muscles in that short trip. These muscles, which lie directly beneath the skin and control the movements of the mouth, cause everything from smiling to whistling, to puckering up for a kiss, to spitting out a watermelon seed. The eyes, the nose, the cheeks, and even the ears are controlled by a similar pattern of overlying muscles that pull the flesh in all directions. Thus, the face can convey emotion, expression.

Imagine, however, if you looked in the mirror and saw something entirely different. Scars, skin, and tissue distorted by a burn. Lips reduced to a circle. And what if what was reflected back at you did not even register to those emotions? What if your face was unable to move—it had been rendered a mask? What if you couldn't recognize yourself in the mirror? If that face—or what was left of it—stared back at you as if it were a stranger, how would you feel?

Most of us take for granted the value of our own face. We don't consciously realize how it reinforces and shapes our identity. When we look into a mirror, we assign an identity to the reflection, and that identity carries a great deal of weight. The reflection says this is a young person or an aging person, a successful person, a person with a goal, a person someone can love. Or perhaps this is someone whose visage is so scarred and distorted that even self-love seems impossible.

In November 2004, the Cleveland Clinic and I attracted worldwide attention when the hospital's institutional review board announced that it considered a face transplant to be both ethical and possible. The Clinic is used to such attention. I wasn't. Calls and requests for interviews came from local and national media everywhere in the world. Whether community weeklies or large metropolitan dailies, all were interested in this story.

Mixed in with the calls from the media were quiet, hesitant inquiries from individuals who wanted to know what the procedure would involve, who would be eligible, and whom they might contact at the Clinic to register as possible candidates for the surgery.

Four years later, in December 2008, I lead the team that performed the first face transplant in the United States, making international headlines.

This book is a response to that attention. It's intended for those who may be interested in the evolution of a microsurgeon, those interested in the medicine that will allow a face transplant, those hoping for a new life, and those who contemplate giving hidden sufferers a new life and permission to walk in sunlight once again. I wanted to tell something of my life, not because it's particularly exciting or laden with adventure but because it shows the path someone would follow en route to conducting a procedure that has never before been attempted.

I've been fortunate not only to be a surgeon but also to be an active researcher in transplantology, one who has made several contributions to the field. My fundamental role is to restore quality of life to those who have been deprived of it

by disease or trauma. For me, as for all other transplant surgeons, test tubes, microscopes, and laboratory benches are as important as scalpels.

There are reasons that this transplant was not considered possible until the dawn of the twenty-first century. It's not because surgeons lacked the skills—those have existed for decades. The impediment to the procedure was our lack of understanding of the immune system and the concomitant inability to influence it. That impediment no longer stands. We can now manipulate the system, not perfectly and not with the finesse we would like but sufficiently to prevent rejection of a composite tissue allograft (tissue transplanted from another human): a face transplant.

At this time, our understanding of the immune response is far from complete. I want to emphasize this point, especially to those readers and their friends who may be contemplating the procedure now or in the future. At present, all composite tissue allograft transplants that involve different tissues require a lifelong commitment to a strict regimen of healthy living and immunosuppressive drugs. In this regard, the patient is perhaps more responsible for the success of the procedure than all the medical specialists involved.

The purpose of this book is also to demonstrate the value of the gift to those who are considering becoming donors as well as to those who have yet to consider the idea. It is not an attempt to encourage donors to come forth. Rather, it lays out the evidence for all to see: the history, labor, challenges, and need.

Contents

About the Author

Maria Siemionow MD, PhD, grew up in Poznan, Poland. She was awarded her medical degree by Poznan University of Medical Sciences in 1974, after which she completed her residency in orthopedics, and then earned a PhD in microsurgery. In 1985, she completed a hand surgery fellowship at the Christine Kleinert Institute for Hand and Microsurgery in Louisville, Kentucky.

In 1995, she became Director of Plastic Surgery Research and Head of Microsurgical Training for the Cleveland Clinic's Department of Plastic Surgery.

Dr. Siemionow stepped on to the world stage in December 2008, when she led a team of eight surgeons in successfully conducting the first near-total face transplantation, a 22-hour procedure. She has since participated in two more successful face transplantations in the Cleveland Clinic.

She moved to Chicago in 2014 to become Professor of Orthopedics and Director of Microsurgery Research at the University of Illinois at Chicago.

Doctor Siemionow has more than 330 scientific publications, among which are 10 plastic surgery textbooks and 3 popular science books. She has contributed to 120 published book chapters. Dr. Siemionow has been featured in international media including CNN, BBC World Service, Associated Press, NPR's All Things Considered, Fox News, the *New York Times*, *Chicago Tribune*, *National Geographic*, and *Forbes*.

Doctor Siemionow is past President of the American Society for Reconstructive Transplantation, the International Hand and Composite Tissue Allotransplantation Society, and the American Society for Peripheral Nerve.

She recently joined her son, Kris Siemionow, MD, PhD, Associate Professor of Orthopedics and Neurosurgery, University of Illinois College of Medicine, in forming Dystrogen Therapeutics, SA, a start-up company seeking to create new chimeric cell therapy for patients with Duchenne muscular dystrophy.

Her numerous awards include the Polish Order of Merit (2009), the Commander's Cross Polonia Restituta Award (2009), the Outstanding Achievement in Clinical Research Award from the Plastic Surgery Educational Foundation (2010), the American Society of Plastic Surgeons' Board of Trustees Special Achievement Award (2011), the Casimir Funk National Science Award (2013), the Heritage Award from Polish American Congress (2016), and the Business Women of the Year Award by Polish Foundation (2017).

Chapter 1
Inching Ahead

On July 15, 1410, on rolling green fields just outside the village of Grunwald, some 39,000 Poles and Lithuanians met and defeated 27,000 Teutonic knights and soldiers in what is said by historians to be the greatest battle of the Middle Ages. The struggle and triumph is familiar to every citizen of Poland but with the exception of a few history buffs and military historians, few outside the borders of my homeland seem to have heard of it.

The quiet, unpretentious neighborhood of Grunwald in Poznan, Poland, was named after that battle. This is the land of my youth.

Each day began with a bowl of warm milk soup, rolls spread with butter, and cheese, and sausage. This was plenty for a young girl on her way to school. I'd shoulder a large, square backpack known as a *tornister* and scamper down the front steps to begin the half-hour walk to Elementary School 44. My friend Barbara would join me along the way, and we talk, giggle about small nothings, and elaborate on our plans and dreams as we strolled past houses and small corner stores where portly, rosy-cheeked merchants sold fruit, candy, soda, beer and newspapers.

Elementary School 44 was a monster. It needed to be. In 1957 Poland was wrestling with the post war baby boom. My classes held 40 or more children, and the school day was divided into morning and afternoon sessions to accommodate the crush.

M. Siemionow, *Face to Face*,
https://doi.org/10.1007/978-3-030-06055-8_1

The first years of my education were dominated by Mrs. Dzierzkiewicz, who taught grammar, reading, writing, mathematics and art. Periodically she turned us loose onto the tree-encircled playground outside.

Oh how those trees and the sunlit playground called to me! As Mrs. Dzierzkiewicz droned on about the role played by the Odra River in the nation's commerce, I'd image myself riding in the Tour de Pologne, a bicycle race that at that time began in Gdansk in the north and wound for more than 1200 miles over hills and down tree-filled valleys to Karpacz in the south. With the wind blowing my hair back and sun on my face, I would flash past cheering onlookers and speed across the finish line and back into reality where, according to Mrs. Dzierzkiewicz, barges laden with coal figured heavily in the development of industry in the communities along the banks of the river.

I did well academically from the day I entered elementary school until the day I received my degree from medical school. At the time, I did not think myself to be gifted. I simply loved to learn and to excel.

I left the *szkola podstawowa*, my elementary school, with a *swiadectwo ukonczenia szkoly podstawowej* (certificate of completion of primary school education) at age 14 and began my secondary education. In Poland there is no equivalent of American middle schools.

My friend Barbara and I were fortunate to be accepted to Lyceum No. 2, a highly respected girls' school that proudly displayed a red number two on the dark blue uniforms we wore for the next four years.

Those years sped past. I remember our Russian teacher, a truly handsome mean, tall with blue eyes. He always wore a suit, tie and smile. He called us *panienki* (young ladies). The first time I heard him address us was a moment to remember. After all the candy and giggles and playgrounds and Tour de Pologne victories during so many spring afternoon geography lessons, I had become a young lady—a lady!

Our uniforms were blue with white collars. You could buy them at any clothing shop in Poznan, although some of the

girls from families who were better off had their uniforms tailor-made. Tailor made or off the rack, it didn't change much. Blue was still blue.

There was only one way to assert individuality. Although the dress code was strict in specifying the uniform, the code's authors neglected to insert any language governing the color of stockings. That was our loophole. At the end of class periods the halls would be filled with roiling rivers of young girls, all in blue, but wearing stockings of every conceivable color found in nature and elsewhere. My stockings were a dark green plaid. I was so proud the first day I wore them that I still smile at the thought how I strutted.

I applied for medical school during my last year at the Lyceum. I was drawn to the humanitarian aspect inherent in the study of medicine and the challenge posed by seeking admittance medical school. My grades were good but good grades did not guarantee acceptance. Competition was tough with a dozen or more applications vying for each opening.

A day came in early summer when a long and anxiously awaited list was posted by the dean's office. On it were the names of students who were accepted to the *Akademia Medyczna w Poznaniu* (Poznan University of Medical Sciences). When you see your name on such a list, there is a fleeting moment of confusion and uncertainty before reality hits. And there among the stately columns of accepted applicants was my name! It was most assuredly my name. I knew because I checked several times and then several times more. I was accepted. I was going to be a doctor.

Ahead of me lay a journey through many countries, institutions, and patients' lives. At that moment, I was an eager young woman looking ahead to a future bright with possibilities. Now that I am a recognized microsurgeon, I can see that the clinical path I followed was but a fraction of a longer path, one that reaches more than 2000 years into the past.

Historians of transplant procedure are obliged to note a Chinese physician named Pien Chi'ao. It is said that about 2500 years ago he exchanged the heart of a man with a strong spirit but weak will with the heart of a man who had a weak

spirit but a strong will. This is a myth, of course, but the story has value. It shows that 2500 years before the first true heart transplant procedure was conducted, people were thinking that it was possible to use one individual's tissues and organs to restore another's.

It also illustrates the psychological attributes we attach to certain organs. The heart pumps blood. It is not the source of strong spirits or weak wills, but it makes for a good myth now as it did then. Even today, when heart transplants are common, we tend to give more emotional weight to certain organs and tissues than we do to others. The heart is one such organ. The tissues that compose the face are another.

An Indian surgeon named Susruta is credited with performing the first cosmetic surgery sometime between 1000 and 600 BC. It was a practice at that time to slice nose noses from criminals, as much to identify and humiliate them as to punish them. Susruta's skill lay in repairing the damage. Unlike Pien Chi'ao's mythical transplants, Susruta's undoubtedly took place, for he left concise instructions for his colleagues and successors. A reasonably experienced surgeon could follow the guidelines today. In the journal article "History of Plastic Surgery in India," R.E. Ranna and B.S. Arora presented the guidelines.

> *The leaf of a creeper, long and broad enough to fully cover the whole of the severed or clipped off part, should be gathered. A patch of living flesh, equal in dimension to the preceding leaf, should be sliced off from the region of the cheek. After scarifying the severed nose with a knife, the flesh is swiftly adhered to it. Insert two small pipes in the nostrils to facilitate respiration and to prevent flesh from hanging down. The adhesioned part is dusted with the powders of Pattanga, Yashtimadhukam, and Rasanjana pulverized together. The nose should be enveloped in Karpasa cotton and several time sprinkled over with the refined oil of pure Sesamum. When healing is complete and parts have united, remove the excess skin.*

In AD 348, Saints Cosmas and Damian, the patrons of physicians and pharmacists, are said to have replaced the gangrenous leg of a Roman deacon with a leg removed from a recently diseased Ethiopian. Although his falls well into the

realm of miracle and certainly wasn't possible according to what we now know about the immune system and tissue rejection, scholar Gabriel Meier noted that the event was portrayed in more than 1500 paintings or illustrations. Apparently, several centuries before the invention of the printing press or rise of mass media, the public was inspired by stunning medical feats.

Johannes Gutenberg had perfected the printing press by 1440. *De Curtorum Chirugia per Insitionem* by Gaspare Tagliacozzi was published 57 year later. It is the first medical text to describe a tissue-transplant technique designed to restore noses mutilated by trauma or disease. Tagliacozzi, who practiced in Bologna at the close of the sixteenth century, was among the first to note the effects of an acute immunological response by observing that although an individual could receive and nurture his or her own transplanted flesh (an autograft), the transplanted flesh of another (an allograft) was invariably rejected. He also originated the nose job, leading many credit him with being the father of cosmetic surgery.

The late 1500s were a violent, disease-ridden time. Noses were hacked and whacked in duels and in practices for duels. Noses were also disfigured by syphilis, a disease that had arrived in Italy about a century earlier.

Tagliacozzi's procedure in involved cutting a flap of flesh from the forearm and fitting it into place over flesh removed from the nose. The flesh was left attached to the arm to ensure reliable blood flow to the tissue while it grew into place on the nose. The doctor devised an elaborate structure to hold the arm to the nose for about two weeks. When the arm's flesh had healed to the nose, the flap was cut loose and the patient was free to move into society with a reconstructed nose.

The procedure was conducted long before the creation of anesthetics, so it must be concluded that the doctor's patients were exceedingly motivated to restore their looks, since they willingly suffered what must have been a terribly painful procedure.

Tagliacozzi also has the dubious credit of being one of the first cosmetic surgeons to awaken a stormy ethical discussion in society—or at least that part of society that was represented by the Church. At the beginning of the Renaissance, although many mutilated noses resulted from war or legal procedure (the law allowed for noses to be removed from thieves and other miscreants), most traumatized noses had been disfigure by syphilis. Church authorities appear to have taken the position that god punished people for sexual transgressions by marking them for all to see. Legal authorities thought the idea had merit, and subsequently noses were lopped from the faces of a variety of miscreants. The Church reasoned that anyone attempting to restore a nose to something resembling its former condition was attempting to circumvent either church law or God's will. Either action carried consequences. The belief that disease and disfigurement represent the actions of a higher power, one whose decision should not be tampered with, continues to be held by a number of religious sects today.

On June 4, 1894, Marie François Carnot, the president of France, had finished giving a speech at a banquet in Lyon and was settling into the seat of an open carriage when the Italian anarchist Sante Caserio elbowed aside the top-hatted dignitaries, leaped into the carriage, and plunged a dagger into the president's abdomen. The blade severed the portal vein which carries blood from the intestine to the liver. Surgeons tried but lacked the skill to repair the damaged vein, and the president died within hours.

Twenty-one-year-old Alexis Carrel, then a medical student at the University of Lyon, took note and resolved that no patient in his care would die because his skills were insufficient to the challenge.

Carrel, a diminutive man with one brown eye and one blue, turned to Madame Leroudier, reputed to be the finest seamstress in the city. Few in the world matched her skills at embroidery and needle point. It is said that when he finished studying her technique with fine needles and threads, he could join two edges of paper together with not a stitch showing on either side.