The history of nasal reconstruction

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**Purpose of review**
Total nasal reconstruction is a unique plastic surgery challenge of the highest order. The history of nasal reconstruction dates back to ancient times and it remains a fundamental challenge today. This article reviews the historical context of nasal reconstruction, and highlights how the essential tenets of this art have been conserved over millennia.

**Recent findings**
The disfiguring and brutal practice of nasal amputation created a demand for ‘nosemakers’ in India since 1500 BC. In 600 BC, Sushruta described the use of a leaf to make a template of the wound, and a cheek flap to supply tissue. In the 1400–1500s, the Italians relied on similar flap concepts, but employed a pedicled arm flap for soft tissue coverage. Eventually, the forehead flap, or ‘Indian method’ of nasal reconstruction, made its way to Europe in the 1800s. Its use has been a fundamental component of nasal reconstruction to this day.

**Summary**
Knowledge of the unique history of nasal reconstruction permits appreciation of this surgical integration of art and science. The story of nasal reconstruction has been one of global contribution and creativity that has stood the test of time.

**Keywords**
‘Indian Method’, forehead flap, nasal reconstruction, Rhinoplasty, Sushruta, Tagliacozzi

**INTRODUCTION**

Nasal reconstruction represents the oldest form of plastic surgery. The unique idea to use a cheek flap to create a nose was first recorded in India millennia ago. Throughout history, this art was passed down through families, modified, jealously guarded, and at other times recorded and shared. Contributors have spanned the globe from Sushruta in India, to the Brancas and Tagliacozzi in Italy, to modern day refinements. To become a ‘Nosemaker’ one should learn how the art and history are intertwined, a testament to the well-principled techniques developed in antiquity.

**NASAL AMPUTATION**

...cutting off the nose is a special way of manifesting vengeance. Of all the organs of the body, the nose is considered to be the organ of respect and reputation.

Shah Tribowandas (1889, India) [1**]

The specialty of plastic surgery traces its roots back to the barbaric practice of nasal amputation. As far back as 3000 BC, there is evidence that nasal amputation existed as a form of punishment. The Hindu poem *Ramayana* (1500 BC), depicted on the walls of Angkor Wat, refers to how the Sri Lankan princess Surpunakha will undergo nasal reconstruction after she suffered nasal amputation [2].

Mass nasal amputations as a war punishment occurred in Nepal in 1767. Kirtipur, a town within the Kathmandu Valley, had repeatedly resisted invasion from the mountain and warlike Ghurka people. When Kirtipur fell, the Ghurka King, frustrated with such a voracious defense, ordered the nasal amputation of all 865 males, sparing only those not yet weaned or those who played wind instruments. The
city was later referred to as Naskatapoor, or the ‘city without noses’ [3].’

Nasal amputation persists to this day. In 2010, Time Magazine featured Bibi Aisha, a young Afghan girl who in an attempt to escape her husband was captured, only to have her nose and ears amputated [4] (Fig. 1).

With the historical frequency of this practice, a demand grew in India for a solution. The human barbarity of nasal amputation was to be met with human ingenuity.

INDIAN METHOD

First the leaf of a creeper, long and broad enough to fully cover the whole of the severed or clipped off part, should be gathered, and a patch of living flesh, equal in dimension to the leaf should be sliced off from down upward, from the region of the cheek and after scarifying [the margins] with a knife, swiftly adhered to the severed nose.

Sushruta (600 BC)

Sushruta recorded the Ayurveda (Science of Life) in the Samhitas sometime between 1000 and 600 BC [5,6]. He focused on the surgical arts, describing surgical instruments, preparation, indications, postoperative care, and techniques. Sushruta writes, ‘Surgery has the superior advantage of producing instantaneous effects by means of surgical instruments and appliances. Hence, it is the highest in value of all the medical tantras.’ [5]. As the first to describe nasal reconstruction, he is referred to as the ‘Father of Plastic Surgery.’

Sushruta described many principles of nasal reconstruction still in use today. He emphasized the importance of a template, in this case a leaf, to appropriately size the defect. Preparation of the recipient wound bed is highlighted so as to accept the flap. Stenting of the nostrils with hollow tubes or reeds will ‘facilitate respiration and prevent the adhesioned flesh from hanging down’, reiterating the difficulty of managing circumferential cicatricial forces. Sushruta focused on the importance of nasal proportion, writing, ‘the adhesioned nose should be tried to be elongated where it would fall short of its natural and previous length or it should be surgically restored to its natural size in the case of the abnormal growth of its newly formed flesh.’ [5].

In the 600s, Vagbhata described folding the flap to provide nasal lining [7].

The art of nasal reconstruction was secretly passed down through generations of three families in the region of India and Nepal. They were among a caste of potters and bricklayers. The Kanghiari family of Khanga (in Punjab) was known to practice the art since AD 1440, keeping a patient registry and requiring signed consent. Sons were taught along with daughters-in-law, but unmarried daughters were not permitted to learn so that if they married, the craft would not escape the family. The precise
timing of the transition to the forehead flap as the predominate Indian Method of rhinoplasty remains obscure [8,9].

ITALIAN METHOD

We restore, rebuild, and make whole those parts which nature hath given, but which fortune has taken away. Not so much that it may delight the eye, but that it might buoy up the spirit, and help the mind of the afflicted.

Gaspare Tagliacozzi (1597)

Translation of the Sushruta Samhita into Arabic in the 8th century is theorized to be the way the Indian Method was introduced to Italy.[8] In Sicily in the 1400s the Branca family practiced the Indian Method, but secrecy prevailed as they recorded nothing of their technique. Bartolomeo Fazio, the historian for the King of Naples, writes:

Branca, the elder, was the originator of an admirable and almost incredible procedure. He conceived how to repair and replace noses that had been mutilated or cut off and developed his ideas into a marvelous art. And the son Antonius added to his father’s wonderful discovery. For he conceived how mutilated lips, ears and noses might be restored. Whereas his father had taken the flesh for the repair from the mutilated man’s face, Antonius took it from the muscles of his arm, so that no distortion of the face should be caused [10].

And so the Italian Method, a delayed pedicled arm flap, was born. Despite attempts at secrecy the technique spread. In 1502, Alessandro Benedetti first recorded the procedure in the medical literature, likely by piecing it together by examining Antonia Branca’s patients. He wrote that the new appendages do not tolerate severe winters and would sometimes grow hair, two details that are only known to surgeons who perform nasal reconstruction [11]. The Vianeo family of Calabria continued the craft in secrecy like those before them [7].

The Italian Method (Fig. 2) is most often associated with anatomist and surgeon Gaspar Tagliacozzi of Bologna. Tagliacozzi writes:

An incision is made in the skin of one of the arms, right or left, down to the flesh, right down to the surface of the muscle; in other words, simple and solid skin is taken from the anterior brachial region... But when one observes a good union of the wound and a good nourishment of the skin, then one may cut the arm from the face [12].

FIGURE 2. The ‘Italian Method’ of nasal reconstruction, a pedicled arm flap. Reproduced from: Gaspar Tagliacozzi, De Curtorum Chirurgia, 1597. (Harvard Medical Library in the Francis A. Countway Library of Medicine, Rare Book Collection. Photographed by D. Shaye).

The spark that rekindled interest in nasal reconstruction came from India in the year 1794. Cowasjee (Fig. 3) was an Indian bullock driver for the English during the 3rd Mysore War, who was...
captured and suffered amputation of his nose and hand by order of Tipu Sultan. An unknown Maharatti healer reconstructed his nose with a forehead flap, and this was witnessed by two English physicians of the East India Company, Mr. Thomas Cruso and Mr. James Frindlay. They described this remarkable surgery in 1793, in the Madras Gazette newspaper in Bombay [13].

Within a year, the news about this procedure arrived in London. In a letter to the editor of the Gentlemen’s Magazine, author ‘B.L.’ described Cowasjee’s reconstruction, how wax was used as a template and forehead skin was transposed...’leaving undivided a small slit between the eyes. This slit preserves the circulation until a union has taken place between the new and the old parts [14].’
Although the European medical community took notice, it was Joseph Constantine Carpue who pursued the Indian Method with vigor. Carpue studied the reports, interviewed army personnel from India, and practiced on cadavers. In 1814, he became the first European to perform the Indian Method on a patient who had lost his nose to syphilis. After removing the dressings three days later he exclaimed ‘My God, there’s a nose!’ Carpue’s text in 1816 helped to spread the technique through Europe and America [15].

MODERN ERA

The 19th and 20th centuries saw the longstanding principles of nasal reconstruction enhanced. A greater respect for the importance of nasal lining flaps developed, and the necessity of lining to avoid contraction and distortion. Surgeons experimented with turn down flaps, local flaps, nasal mucosal flaps, and (more recently) free tissue to provide nasal lining [16].

In the 19th century, the benefits of nasal framework to control nasal form were realized. Surgeons trialed the use of calvarial bone attached to the forehead flap [17], iliac bone graft [18], and costal cartilage [19]. The latter has become the mainstay of structure in total nasal reconstruction. A future of bio-engineered autologous cartilage, cultured from sample chondrocytes of the patient, may one day offer unlimited cartilage stock with the possibility of stereolithography frameworks [20].

In 1985 Burget and Menick described that by visualizing the nose as a series of subunits, these components could guide reconstruction for optimal outcomes [21]. Menick’s lifetime work in nasal reconstruction is a testament to nasal reconstruction of modern times [22]. Modern nasal reconstruction has incorporated how we ‘see’ the nose and its complex array of curves and shadows. We are left wondering how the innovative surgeons of centuries past visualized the noses they were reconstructing?

Nasal prostheses have been an alternative to reconstructive surgery for centuries. The development of modern silicones and osseointegration in the 20th century served as a breakthrough for prosthetics. Nasal prosthesis permit oncologic surveillance and offer a temporary or permanent alternative to surgery. Patient satisfaction research has examined the health utility of the rhinectomy defect, and how prosthetics and reconstructive surgery may address the psychological effects on well-being [23]. Quality of life after nasal prostheses equals that of total nasal reconstruction [24], thus surgeons must tailor an individual plan based on each patient and setting. Some settings may not have any prosthetic options or the patient cannot afford prosthetic replacements costs.

The choice to embark on total nasal reconstruction is therefore up to the surgeon as much as the patient. As the history of nasal reconstruction has demonstrated, it is a challenging journey of unknown outcomes, but holds the exciting promise of great restorative value.

CONCLUSION

Out of the barbarity of nasal amputation sprang the ingenuity for nasal reconstruction, exemplified by masters from India and Italy. For millennia, the fundamental principles of nasal reconstruction, such as pedicled flaps and wound templates, have been practiced relatively unchanged. Understanding nasal reconstruction’s past is essential to becoming a ‘Nose-maker,’ for both the art and history are intertwined.

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