

Mastectomy by Nicolas-Henri Jacob and Jean Baptiste-Marc Bourgery.<sup>6</sup>The main image portrays the surgeon making an incision while an assistant retracts. The patient is awake and not anaesthetized. The smaller inset images show the incision itself in greater detail as well as the closed and dressed wound with an apparent drain in place.

# Idealized mastectomy:

19th century developments in breast surgery and anatomic illustration



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The fields of medical illustration and breast surgery advanced dramatically during the 19th century. Jean Baptiste-Marc Bourgery and Nicolas-Henri Jacob published their anatomical atlas *Traité complet de l'anatomie de l'homme comprenant la médecine opératoire* (1831–1854), and German-American artist Max Brödel (1870–1941) set a new standard in medical illustration.

The most notable developments in breast surgery included a shift from nodal excision to progressively radical mastectomies, spearheaded by Charles Moore, Herbert Willy Meyer (ΑΩΑ, Columbia University, 1918), and William Halsted. Despite incredible surgical changes during the 19th century, the illustrations of mastectomy during this time demonstrate the disparity between artistic depictions and surgical reality.

## 19th century mastectomy illustrations

The union of artistic and surgical developments is evident in the striking illustrations of mastectomy which were influenced by the 19th century rise of Neoclassical trends in art.<sup>1</sup> The images reveal a striking disconnect between art and reality, encapsulated by a clean, idealized depiction of what was a severe, painful, and disfiguring procedure.

Bourgery began creating the *Traité* in 1831, with the final volume being published in 1854, five years after his death.<sup>2</sup> It is a massive collection of 725 lithographs from drawings by Jacob, an accomplished artist who had studied with leading French painter Jacques Louis David (1748–1825).<sup>2</sup>

Bourgery supervised careful dissections that Jacob would depict, sometimes in conjunction with a lithographer and colorist.<sup>2</sup> Their combined efforts resulted in images that were anatomically accurate, and artistically beautiful.

Previously, anatomical illustrations reflected the ideals and trends of Renaissance and Baroque art featuring skeletons posed in prayer or *écorchés* (flayed figures) leaning on trees amidst pastoral scenes.<sup>3</sup> Through the 18th and 19th centuries, illustrations became “far less concerned with natural theology, the depiction of a human body made in the image of a benevolent God, but they were no less freighted with meaning beyond their overt medical content”.<sup>4</sup>

During the 19th century, dissection became a standard

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Halsted radical mastectomy by Max Brödel.<sup>15</sup> In the earlier stage of the procedure, the patient is undraped and apparently unfazed, while in the more advanced dissection she is draped.

part of medical training. Renaissance and Baroque artistic conventions were replaced by those of academic dissection practices, which aligned with Neoclassicism. Cadaveric specimens were draped just as they were in the dissection laboratory, and just as the edges of busts and portraits were softened with fabric in the artist's studio.<sup>4</sup> Also, according to Neoclassic fashion, the figures in illustrations were sometimes portrayed in almost regal repose.<sup>1</sup> If faces were shown, they appeared to be in peaceful sleep, or awake with minimal, serene emotion.<sup>1</sup>

Although less pious in nature, the images are remarkably idealized, and straddle the border between scientific documentation and artistic fantasy. Jacob wrote in the *Traité* that he and Bourguery aimed to portray “[a]n ideal form, the most beautiful and most perfectly developed of the species.”<sup>5</sup> Bourguery encouraged a dialogue with Jacob that would allow their work to be a union of medicine and art.<sup>5</sup>

Photography began to be employed in the preparation of medical illustrations in the second half of the 19th century.<sup>3</sup>

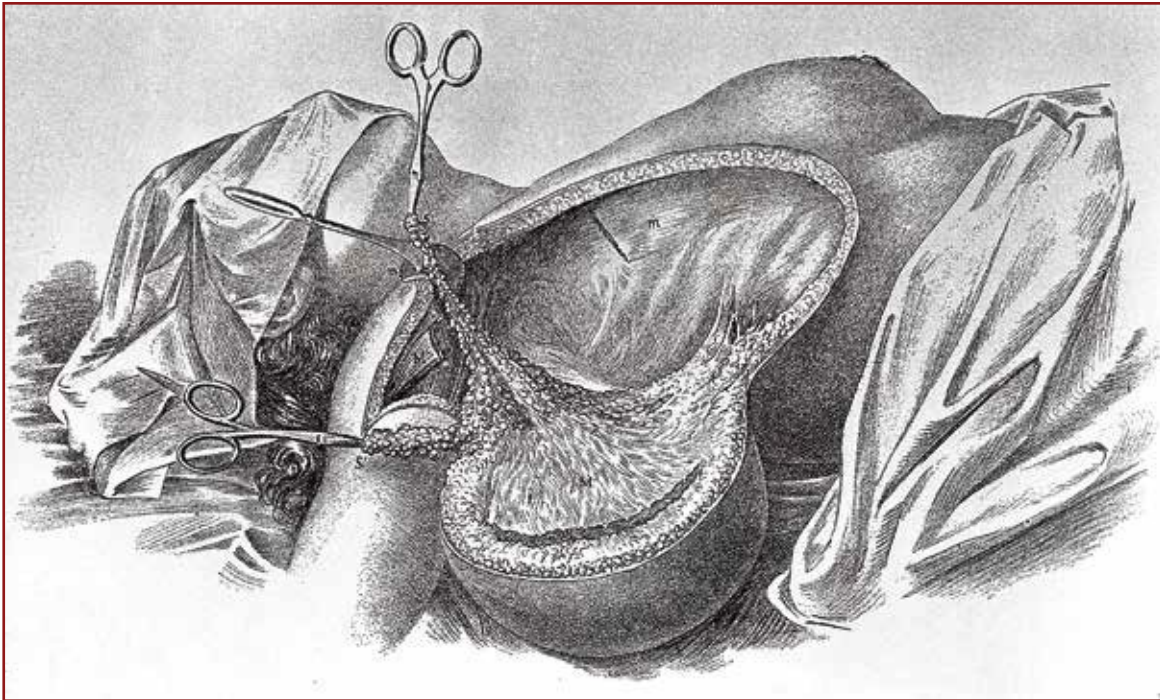
However, engravings and lithographs remained popular because artists could use shading and texture to highlight specific features of a specimen.<sup>4</sup> Artists could employ narrow palettes of colors to highlight different structures or tissues—red for arteries, crimson for muscle, blue for veins,

and yellow for nerves.<sup>4</sup>

Mass production of photographs was prohibitively expensive, and medical students needed cheap, practical textbooks.<sup>3</sup> Lithographs were clearer, their colors more vivid, and they were amenable to mass reproduction.<sup>4</sup> Lithographs and engravings allowed the flourishing of anatomical book publishing which took place in early 19th century Europe.<sup>4</sup>

A lithograph from *Traité* features a woman undergoing a mastectomy without anesthesia. The first of the three images shows the hands of the patient's surgeons retracting and excising breast tissue, while the other two focus on the incision and the surgical dressing.

The first image is the most striking, a work of art just as much as it is a tool for surgical instruction. With her neatly coifed hair, and sheets elegantly draped around her, the patient looks like the subject of a Neoclassical painting. Jacob chose to portray her with eyes open, awake and aware during the painful procedure. Her face is completely relaxed without any sign of discomfort or pain. She does not acknowledge the hands of the surgeons invading her skin and subcutaneous tissue.



Brödel drawing of advanced dissection during Halsted radical mastectomy.<sup>15</sup>

### 19th century breast surgery

Socially, the divide between surgeons and physicians diminished during the 18th and 19th centuries as more surgeons underwent formal medical training, and the practice of surgery became more scientific.<sup>7</sup> Breast cancer treatment began to reflect a transition from the Greek physician Galen's ancient humoral theories of disease to concepts that reflected the development of the clinical-pathological correlation, and cell theory.

One manifestation of this was the recognition that breast cancer could spread through the lymphatic system, which included the axillary nodes.<sup>8</sup> French surgeon Henri François Le Dran (1685–1770) was one of the first to dissect enlarged axillary lymph nodes in cases of breast cancer, with the goal of local control and the prevention of further spread through the lymph system.<sup>8</sup>

Jean Louis Petit (1674–1750) another French surgeon proposed excision of the breast, palpable lymph nodes, and pectoral fascia and muscle.<sup>9</sup> Thus, Petit was the first to propose a radical mastectomy.<sup>9</sup>

Breast surgery in the first half of the 19th century was embroiled in debate over the preceding century's developments. Various surgeons resurrected old techniques from Ambroise Paré's (1510–1590) use of compression to cut off

blood supply; to cauterization (a technique documented in the practice of breast surgery as early as the first century AD); to bleeding with leeches or lancets, and the administration of hemlock, arsenic, or mercury.<sup>8</sup>

Several surgeons decried operative treatment if lymph nodes were involved by cancer. Scottish surgeon James Syme (1799–1870) wrote in his 1842 book *Principles of Surgery*, "It would be subjecting the patient to useless pain and would bring surgery into discredit to attempt extirpation in cases where the extent or correction of the disease prevented its complete removal."<sup>8</sup>

This was the environment in which Bourguery and Jacob depicted mastectomy in *Traité*. Their illustrations were featured in an 1844 book by Philadelphia surgeon Joseph Pancoast (1805–1882), *A Treatise on Operative Surgery*. Accompanied by 80 full-page plates, this text was the main means by which the *Traité* illustrations became accessible to American surgeons.<sup>6</sup>

Pancoast, in his discussion of breast surgery accompanying the Bourguery-Jacob illustration, stated:

[P]erfect recovery occasionally takes place after the removal of a cancerous breast, but that in the greater number of cases a return of the disease is to be expected,

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either at the site of the cicatrix, or upon some of the internal viscera. [...] The essential principle in reference to [a mastectomy's] success, is to remove the cancerous breast, while it yet forms a well-circumscribed and local tumor. If it has involved the chain of axillary glands, and especially if it has become adherent to the pectoral muscle, or has formed an open ulcer, the chances of success, even when there is a prospect of removing apparently all the tissue affected, will be considerably impaired, and the operation ought not to be undertaken without a candid statement on the part of the surgeon of the liability of the patient to suffer sooner or later a return of the affliction.<sup>6</sup>

But, a few paragraphs later, Pancoast states that lymph nodes must be removed if they are found to be “scirrhous, or are even indurated and enlarged.”<sup>6</sup> He was among the first surgeons to describe removal of the breast with its axillary lymphatic drainage with one incision and accompanying procedure.<sup>8</sup>

Surgical treatment for breast cancer increased in the latter half of the 19th century due in part to the introduction of surgical anesthesia in 1846; the progressive adoption of antiseptic wound treatment in the 1870s and 1880s; and a growing understanding of the cell theory and its implications for the spread of cancer.<sup>7</sup>

Several prominent surgeons turned their attention to increasing the magnitude of excisions. Moore (1821–1870) was a strong proponent of excision of the entire breast, reasoning that any remaining traces of cancer would lead to recurrence.<sup>9</sup> Before him, there had been no standardized operation, and surgeons varied on whether they removed lumps, breast segments, or entire breasts, with or without skin flaps.<sup>7</sup> Moore criticized partial resections, and advised removal of the entire breast, including adjacent skin, areolar tissue, and axillary lymph nodes if they appeared to be cancerous.<sup>8</sup> This approach differed from radical mastectomy in that Moore did not promote routine removal of the pectoralis major muscle.<sup>8</sup> Moore's approach became standardized in accordance with his recommendations.<sup>7</sup>

Antiseptic surgery pioneer Joseph Lister (1827–1912) introduced antiseptic wound treatment which halved the operative mortality of mastectomies with axillary lymph node removal, as well as overall mortality.<sup>7</sup> Lister adopted Moore's approach, but advocated division of the pectoral muscles to provide better exposure during axillary lymph node dissections.<sup>8</sup>

Halsted is best known for promoting radical excision of breast cancer. Like Moore, he believed that extensive local surgery could remove cancer cells and prevent future

growth.<sup>10</sup> He thought that breast and other malignancies began as small foci that enlarged in a slow, centrifugal manner before spreading.<sup>10</sup> Halsted was influenced by German pathologist Rudolf Virchow's research which demonstrated that cancer arose from collections of diseased cells, and spread through the lymphatic system.<sup>11</sup>

In 1894, Halsted published a landmark article on his technique of classic radical mastectomy, in which he described removal of the axillary nodes and excision of the pectoralis muscles and fascia.<sup>8</sup> It was known as the “complete operation” rather than the “radical mastectomy.”<sup>8</sup>

In the article, Halsted presented data based on 50 patients he had treated since 1889.<sup>12</sup> His recurrence rates were only six percent compared to the 50 percent to 80 percent recurrence rates from mastectomies performed using the method of German surgeon Richard von Volkmann (1830–1889)<sup>8</sup> who advocated removal of superficial pectoral muscle fibers.<sup>8</sup> Halsted wrote, “Volkmann's operation is manifestly an imperfect one. It admits of the frequent division of tissues which are cancerous, and it does not give the disease a sufficiently wide berth.”<sup>12</sup>

Meyer described his version of Halsted's radical mastectomy in a lecture he delivered 10 days after Halsted's article was published.<sup>7</sup> Meyer's mastectomy differed from Halsted's in that he performed the axillary dissection before the breast and muscle excision, and used scissors in order to decrease the surgical time.<sup>9</sup> Meyer also removed both pectoral muscles.<sup>7</sup>

## Radical mastectomy

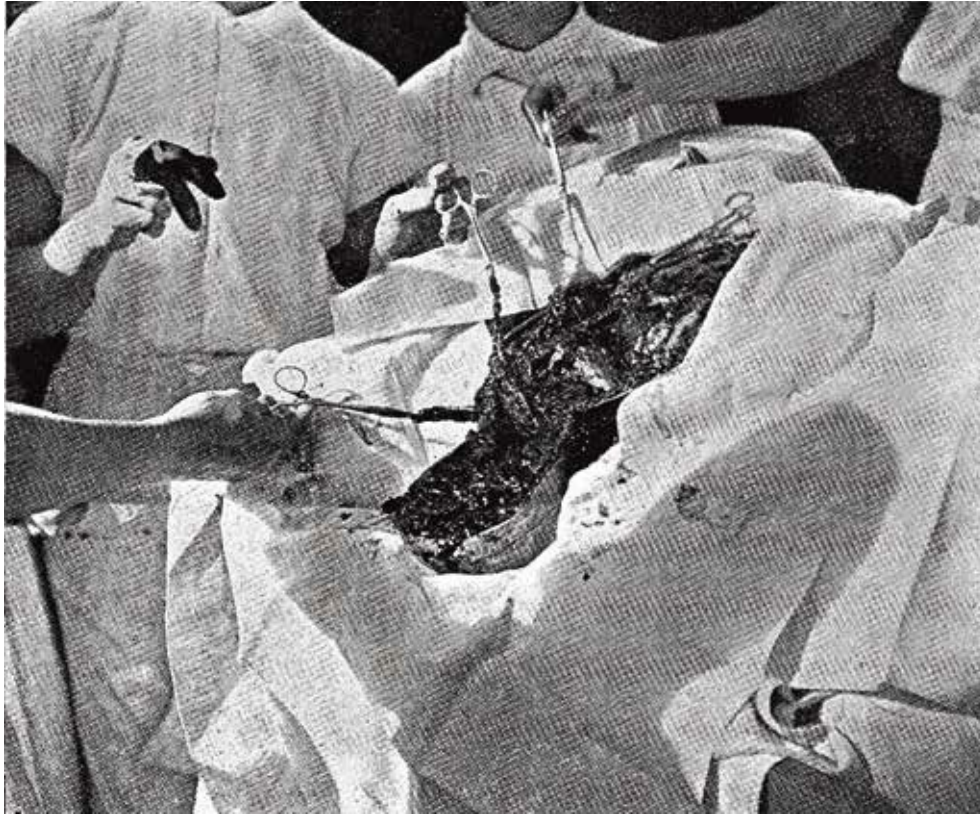
Halsted is credited with bringing the radical mastectomy to its final form due to his reputation for meticulous surgical technique, and his emphasis on en bloc removal of the cancerous tissue to prevent seeding of cancer cells into the operative site.<sup>10</sup> The data he obtained from retrospective case reviews demonstrated remarkable decreases of local recurrence after his procedure, as well as improved cure rates in patients with lymph node-negative disease.<sup>10</sup>

By 1915, the Halsted radical mastectomy was the standard procedure for breast cancer at all stages.<sup>10</sup>

Halsted's procedure gradually declined in popularity toward the end of the 20th century with the advent of chemotherapy; wider use of radiation; increasing concern about the side effects caused by radical mastectomy; and the demonstration that more limited surgical approaches could be equally effective.<sup>10</sup>

## Brödel, *illustrator extraordinaire*

German-American artist Max Brödel (1870–1941) drew



Earliest photograph of a Halsted mastectomy.<sup>15</sup> Note the absence of rubber surgical gloves, which Halsted did not start using during procedures until about 1894.<sup>10</sup>

the illustrations for Halsted's article.

In 1894, when Halsted presented his mastectomy data from the Johns Hopkins Hospital at a medical meeting, Brödel had just begun working at the institution.<sup>13</sup> He had no formal medical training, but became well versed in anatomy and pathology,<sup>14</sup> and produced unique illustrations with exquisite detail. He used perspectives that allowed the viewer to observe the scene through the surgeon's eyes. Brödel would become the first director of the Johns Hopkins Department of Art as Applied to Medicine.<sup>14</sup>

Brödel's illustrations of Halsted's mastectomies were among his first works at Johns Hopkins, as well as one of the earliest representations of the radical mastectomy.<sup>15</sup> The first of Brödel's images bears many similarities to that created a half century earlier by Jacob and Bourgery. The woman lies supine with her breast incised and ready for dissection of the chest wall along with the pectoralis muscles. She is draped in a beautifully rendered sheet. Her hair is neat, and her facial appearance does not suggest pain or fear. She looks completely calm. The focused gaze of the patient is in full view. Her dark, unwavering eyes implore onlookers to consider her as more than an inanimate object, but a living, breathing woman.

In Brödel's second image, the patient's face is covered with a cloth. The artist's decision to portray her in this

fashion may have been influenced by the more graphic nature of the breast excision in this image. The combination of a full gaze with the depiction of a swollen breast hanging from the chest wall, tethered only by a few clamps and tense threads of tissue, may have been considered too unsettling by the artist for his audience. Still, the rendering of the drape on her face remains beautiful, recalling the elegant folds in the dress of a subject of classical marble sculpture. Brödel chose to draw the patient's loose curls of hair in such a way that an astute viewer will recognize the woman's youth, despite her obscured face.

### **The use of anesthesia**

These early mastectomies caused significant pain and disfigurement. Anesthesia was introduced in 1846—two years after Pancoast's book was published.<sup>8</sup>

Halsted's patients had the benefit of anesthesia, but his radical mastectomy procedure (done with the hope of reducing local and regional recurrences of cancer) left women severely disfigured.<sup>16</sup> Excision of the pectoralis major could leave the woman in a shrugging position without the ability to move her arm normally, and lymphedema could cause severe arm swelling.<sup>16</sup> Infection and hemorrhage were also significant risks, along with severe ongoing pain, and morbidity.<sup>16</sup>

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### The gender gap

There is a gender aspect to mastectomy and the artistic depiction of the procedure. In the 19th century, surgeons were mostly male, and patients who underwent surgery for breast cancer were predominantly female. Gender was relevant in the conversations surrounding mastectomies.

Women in the 19th century underwent mastectomy at the counsel of male physicians who sought to excise every cancerous cell. They experienced pain and sacrificed a significant portion of their physical femininity. They were willing to accept the disfigurement with the hope that the operation would ward off recurrences of the deadly disease.

Some of Halsted's patients wrote to thank him for performing what they hoped would be a life-saving procedure. Others wrote to alert him of their pain, arm swelling, mutilation, and humiliation.<sup>10</sup>

Brödel's and Bourgerie's illustrations presented idealized images detached from the reality the female patients suffered.

The 19th century women who underwent mastectomy did so in an era of debate and experimentation. They were pioneers of the development of surgical therapy of breast cancer, as were the men who operated on them.

### 21st century breast cancer treatment

Today, partial mastectomies are outpatient procedures, and total mastectomies usually require only a short hospital stay.

While the surgical treatment of breast cancer has been greatly enhanced since the 19th century, controversies and debates concerning breast cancer management persist. The demographics of the medical profession continue to change along with disease concepts and treatment strategies.

An increasing number of women specialize in breast care, are breast surgeons, administer radiation, deliver chemotherapy, and advise patients. Women come to surgeons armed with more information and comfortable asking difficult questions. Health care providers and surgeons are now encouraged to provide patients with knowledge, and to participate in shared decision-making. Providers continue to strive every day to make the authoritarian, patriarchal delivery of medicine that persisted in prior centuries a phenomenon of the past.

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