

Articoli/Articles

CORRECTING THE 'UNNATURAL' BREAST: GYNECOMASTIA AND GENDER IN MEDIEVAL MEDICINE

BELLE S. TUTEN
Juniata College, Huntingdon, Pennsylvania, USA
tuten@juniata.edu

SUMMARY

CORRECTING THE UNNATURAL BREAST

This paper discusses the transmission of a surgical procedure for the correction of gynecomastia, or female-like breasts in men. The procedure originated in Greek medicine and was passed to Arabic and later Latin authors on surgery. The paper argues that persistence of the text and its adaptation into Latin are evidence that the procedure maintained a gendered meaning for Latin authors. This gendered meaning led Latin authors to continue copying the procedure, though not to perform it.

This paper discusses the transmission of a procedure to correct gynecomastia in men from its inception in the work of the Byzantine writer Paul of Aegina through to the surgeons of the thirteenth century. Gynecomastia is the overdevelopment of breast tissue in men and is now understood as a side effect of imbalances between estrogen and testosterone. It most frequently occurs in pubescent boys, and at times also develops in men as they age¹. The effect varies from simple prominence of the nipples to the development of full female-like breasts. The puberty-associated version of gynecomastia clearly existed in the late ancient and medieval periods and posed interpretative challenges for the authors who addressed it. As the text

Key words: Breast - Gynecomastia - Surgery - Medieval

was adapted through different languages and locations, it absorbed the concerns and ideas about gender shared by the people who translated and copied it. Its changing characteristics also demonstrated the ways in which surgical knowledge traveled to Europe and how European surgeons may (or may not) have used it in the late Middle Ages. It is likely that the procedure was never performed in Europe, but its persistence in Latin sources attests that it expressed relevant concerns for the Latin authors who adapted it. These adapters did not choose to pass on practical instructions; rather, they passed on their negative views of the condition, and left out the parts of the procedure that might have made performing it possible for other practitioners. The survival of the gendered distinction and loss of the practical instructions show that the gendered values, rather than a need for a procedure to correct gynecomastia, were the reason for the text's survival in Latin.

The surgical procedure to correct gynecomastia belongs inside a larger context about normative secondary sex characteristics in the medieval world. Much of the medical view was shaped by Galen, who loomed very large in the entire tradition of the gynecomastia text, as well as generally influencing Greek, Arabic and Latin medicine throughout the Middle Ages². Galen conceptualized the female body as spongy and moist, and the male body as harder and drier; therefore, it was possible for any given individual to be somewhere between hot and cold, and somewhere between wet and dry³. Medical intervention as Galen understood it was intended to bring each person into balance “according to nature” (κατὰ φύσιν). Because of the composition of female flesh, which could easily be too wet and cold, women were more likely to fall out of balance than men⁴. Breasts, however, had to be moist enough to produce milk and to feed babies, a function Galen identified in *On the Usefulness of the Parts* as an ideal design through which Nature ensured mankind's survival⁵. Much of the medical literature that addressed the breasts

in the ancient world had its basis in concerns about breastfeeding and the need to ensure the quality of milk and the health of the wet-nurse. These texts often analyzed the size and appearance of a wet nurse's breasts to discern whether or not she would give good milk; they generally did not speak of beauty or of any ideals about how a woman's breasts might look⁶.

In the case of men, however, having female-like breasts could be so problematic that a man might seek further intervention. The origin of the surgical procedure to correct gynecomastia is in the *Seven Books* or *Pragmateia* of Paul of Aegina, who lived and wrote in seventh-century Byzantine Greece. Little is known about this author, although he was clearly prolific⁷. He remarked in the prologue to his work that he intended to put together an epitome for the use of physicians, who were not as well-served by written language as scholars of the law⁸. In this he was certainly successful. The *Pragmateia* influenced other writers almost immediately: first in Syriac, and later in Arabic after a translation in the school of Hunayn ibn Ishaq in the ninth century. Aspects of it appear in the works of Arabic writers such as Ali ibn al-'Abbas al-Majusi (known as Haly Abbas in Europe), Abū 'Alī al-Ḥusayn ibn Sina (Avicenna), and Abū Bakr Muhammad ibn Zakariyyā al-Rāzī (Rhazes), and through their work it also influenced European surgeons in the later Middle Ages⁹. Peter Pormann has argued that the *Pragmateia* became so integral to the Arabic medicine of the early Middle Ages that Paul's text in itself fell out of use. Thus Paul's work became less visible in Arabic authors, but his works still exerted considerable influence over the structure and reasoning of medical writers¹⁰.

Paul's text on gynecomastia is a straightforward description of the problem, his criticism of it, and his suggested treatment.

As in the season of puberty (τὸν τῆς ἡβῆς χρόνον), the breasts of females swell up, so in like manner those of the males also swell to a certain extent;

but for the most part they subside again. In some cases, however, having acquired a beginning they go on increasing, owing to the formation of fat below. Wherefore, as this deformity (ἀπρεπεία) has the reproach of effeminacy (θηλύτητα), it is proper to operate upon it. Having, therefore, made a lunated incision below the breast, and dissected away the skin, we unite the parts by sutures. But if, as in women, the breast incline downward, owing perhaps to its magnitude, we make in it two lunated incisions, meeting together at the extremities, so that the smaller may be comprehended by the larger, and dissecting away the intermediate skin, and removing the fat, we use sutures in like manner. But if, through mistake, we should cut away too little, we must again remove what is redundant, and apply the remedies for fresh wounds¹¹.

The phrase *tòn tēs hébes chrónon*, translated here as “the season of puberty” could also mean “the time of youth”. Paul indicated that the formation of breasts in a young man is an *aprepeía*, meaning a “deformity” or an “indecentcy” that causes the young man to be *thelúteta*, “feminine”, “womanish” or “effeminate”. He implied that it could cause reproach, perhaps from the young man’s family or from his larger circle. Although the condition is not life-threatening, Paul found the stigma could be a serious enough reason for surgery. This surgery required an incision underneath the breast to remove extra fat, which was then sutured shut; if there was even more need, Paul recommended a more substantial removal featuring two incisions, or even multiple procedures if the problem were still present. To understand Paul’s work it is necessary to discuss it in the light of ancient Byzantine concepts of gender. Kathryn Ringrose has argued that in general, the concepts of maleness and femaleness were fluid in Byzantine Greece because of the medical authorities’ reliance on the Galenic humoral system¹². Paul’s chapter on gynecomastia shows a clear influence from Galen’s systematic understanding of the body and by his belief in the moral superiority and perfect design of nature. Galen was very critical of efforts to change the human body in what he termed activities “contrary to nature” (παρὰ φύσιν, παρὰ

phúsin), such as cosmetic changes, or even bodybuilding; the most pleasing aspect of the body was its balanced nature, neither overdeveloped nor underdeveloped¹³. Gynecomastia could certainly be understood as unnatural in itself, as Paul's use of the word "deformity" implies: the condition violated his concept of what was proper to male and female bodies. This view permeates the *Pragmateia*; for example, Paul regarded a clitoris that was excessively large as a "deformity" that required surgery to correct¹⁴.

It is also possible to identify a second reason why Paul might have objected to the appearance of breasts on men. The Byzantines practiced castration, providing slave eunuchs as servants to upper-class families and royal courts. The procedure gave these castrated men a distinct appearance that was neither conventionally male nor conventionally female¹⁵. Although Paul was one of the few ancient authors to give specific information about the procedure for castration in young boys¹⁶, he considered the physical condition of a castrate to be as unnatural as a man with breasts. His objections to conditions against nature continued in his section on eunuchism (περὶ ευνουχισμού, perì eunouchismou). "The object of our art [medicine]", he wrote, "being to restore those parts which are in a preternatural state to their natural, the operation of castration professes just the reverse"¹⁷. He objected to castration because it moved a healthy body away from its natural state into an unnatural one. He also acknowledged that "we are sometimes coerced against our will by persons of high rank to perform the operation"¹⁸. Similarly, in a section on hermaphroditism, which he described as a "great deformity to both sexes (ἀπρέπειαν ἀμφοτέροισι τοῖς γένεσιν, aprépeian amphotérois tois génesin)", he advised surgery on indeterminate genitals to make them conform to what he considered to be natural standards¹⁹.

If late ancient Byzantines had regular contact with castrated men, it is worth considering the effect of castration on the human male body in light of Paul's approach to gynecomastia. The low testoster-

one levels that occurred after castration made young men develop in specific ways as they grew: they had longer, more gracile long bones; less muscle mass than uncastrated men; and finer features, sometimes punctuated by larger jaws²⁰. Kathryn Ringrose notes that ancient eunuchs were often described as physically beautiful because of their beardless cheeks and finer bones²¹. They also are likely to have developed breasts. Modern studies of Chinese, Turkish and Russian cases have indicated an incidence of gynecomastia in castrated men²². If Byzantine eunuchs often had pronounced chests or gynecomastia, the negative language that Paul applied to both castration and gynecomastia is consistent - and surgery would be necessary to correct the effeminizing effects of gynecomastia on men who did not want to look like eunuchs. This would be a natural, rather than unnatural, cosmetic concern, and well within his values. It is necessary, however, to inquire whether the same concerns motivated those who later adapted his works for other cultures. Although later writers had less exposure, or no exposure at all, to eunuchs, all the writers were influenced by similar expectations. We can observe this by noting the words, which are sometimes aesthetic, sometimes philosophical, and sometimes gendered, in the adaptations of the text. There are two strands of transmission into the Latin West for the recommendation to perform surgery on men with overdeveloped breasts. Both depend on adaptations of Paul of Aegina made by Arabic authors. Paul's discussion of gynecomastia was adapted into the *Kitab al-Maliki* or *Pantegni* of the Persian scholar 'Ali ibn al-'Abbas al-Majusi (d. ca. 984 CE), known as Haly Abbas in the west. It was also adapted into the *Kitab at-Tasrif* of the Muslim scholar and physician Abu al-Qasim Khalaf ibn 'Abbas al-Zahrawi, called Albucasis in the west, who lived from 936-1013 CE in Córdoba, Spain²³. The first strand of the transmission came from the translations of al-Majusi's work by Constantine the African (d. before 1099) in the eleventh century, and by the translation of Stephen of

Correcting unnatural breast

Antioch in the early twelfth century²⁴. The second strand, which we will examine here, was the transmission of the work of al-Zahrawi via the translation of Gerard of Cremona (ca. 1114-1187). This tradition is of particular interest because of its precise language, its practical instructions, and the use of diagrams.

It is worthwhile to begin with a translation of al-Zahrawi's Arabic text. His tone was straightforward, with specific details about the procedure which may suggest that he made at least one attempt at performing it. He also added cautions for his readers who might be inclined to do the procedure using his method²⁵.

The breasts of some males may swell on attaining puberty so as to resemble the female breast, and they remain permanently swollen and ugly. If this is abhorrent, a semicircular incision should be made on the breast, like this figure from b (ب) to g (ج). Then dissect away all the fatty tissue and pack the wound with a cicatrizing compound and sew the lips together and dress until healed. But if the breast is pendulous and flabby on account of its size, as happens with women, you should make two semi-circular incisions on the upper side, the ends joining one another, in such wise that the longer incision encircles the other like this, from b (ب) to g (ج). Then dissect away the skin between the two incisions and remove the fat and sew up as we have described; and apply styptic powder and the necessary dressings until healed. But if you cannot make the incision as full and perfect as it ought to have been, because the patient is restless, or because hemorrhage arises, you should pack the wound with cotton wool soaked in corrosive ointment and leave till it eats away the remainder of the fat; then dress until healed²⁶.

Al-Zahrawi also included diagrams for how the procedure should be performed (Fig. 1). The text advised that the surgeon incise from right to left, as Arabic would be read, from letter b to letter g. Al-Zahrawi also changed Paul's procedure by placing the incision at the top of the breast. A second incision connected to the first in a half-moon shape, also on the top, could be added in order to access more fat. It is interesting that al-Zahrawi lifted the breast, rather than tucking it under, possibly because the bulk of the tissue that makes up

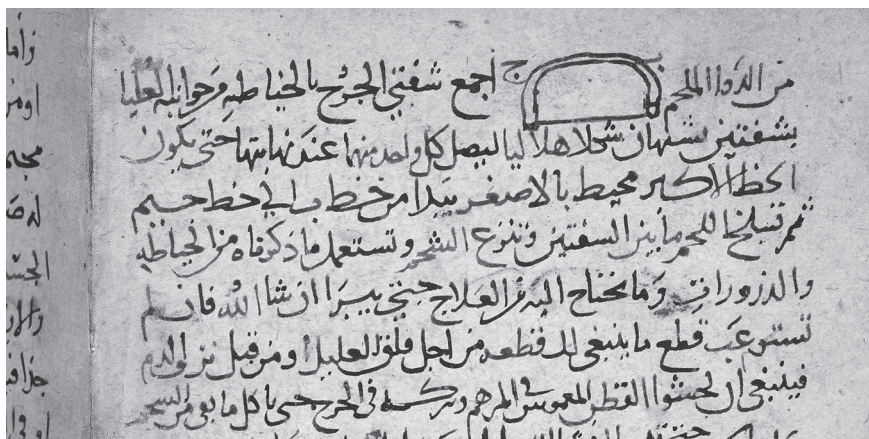


Fig. 1. Abū al-Qāsim Khalaf al-Zahrāwī (Albucasis), *Kitab at-Tasrif*. The Bodleian Libraries, University of Oxford, Ms. Marsh 54, fol. 48v. 1271-2.

the breast is in the upper outer quadrant²⁷. Further suggestion that al-Zahrawi may have performed this surgery can be discerned from his remarks about the restlessness of the patient and the need to control hemorrhage. He echoed Paul when he advised that a caustic preparation placed inside the wound might eat away the fat²⁸.

Al-Zahrawi's text also reflects some of Paul's distaste for gynecomastia; the word "ugly" (*qabīḥ*), a word that can also mean "unsightly" or "unhealthy", replaced Paul's use of "deformity", and he did not mention a worry about effeminacy. "Ugly" is a more aesthetic complaint than a gendered one, which suggests that men with breasts might be more unattractive than effeminate. By "ugly" al-Zahrawi may also have implied "unnatural", a continuation of Galenic influence which is visible in other parts of his work as it is in Paul's. For example, when he copied Paul's treatment of women for an overdeveloped clitoris, al-Zahrawi described the condition as "above the order of nature"²⁹.

It is not possible to know whether al-Zahrawi connected the condition of gynecomastia with eunuchism. Eunuchs were present in

Muslim Spain, though we do not know how many there were, and the sources are very unclear. The procedure for castration is included in many Arabic surgical writers, including al-Zahrawi himself³⁰. He gave neutral instructions for castration, writing that castrating men was forbidden by religious law, but stating that a surgeon should know the procedure in case he was called in either to help a person who had been castrated or to geld an animal³¹. The sense of his section recalled some of the cautious language that Paul used to justify his knowledge of the procedure. In total, however, Al-Zahrawi's language about castration did not disparage effeminacy in the way Paul's had. This was also true in his treatment of hermaphroditism, in which he detailed the corrective surgery for the procedure but did not state a rationale for why it might be necessary³². Paula Sanders, who has traced the procedures by which Islamic courts determined a male or female sexual identification for hermaphrodites, has argued that Muslim jurists were more concerned with determining the sex of an individual for legal purposes of marriage and inheritance than for the application of any kind of social stigma³³. Sherry Syed Gadelrab has similarly argued that although Muslim writers considered the female body inferior to the male, their physiological theories about the production of seed made it possible for men and women to have traits that were not "characteristic of their gender"³⁴. This may account for al-Zahrawi's comparatively mild assessment of the reasons why men might choose to have surgery for gynecomastia.

Al-Zahrawi's work made its way to European readers and writers via a translation by Gerard of Cremona (ca. 1114-1187) in the 12th century. Of the thirty books in the *Kitab al-Tasrif*, Gerard translated only the thirtieth, which was the section on surgery³⁵. This document, along with two of his other translations, the *Liber al Almansorem* of al-Razi and the *Canon* of Ibn Sina, exerted considerable influence on the surgical writers from the twelfth century to the fourteenth and fifteenth centuries³⁶. The chapter on gynecomastia came with the larger

work, and was duly translated into Latin³⁷. As Emilie Savage-Smith has argued, however, it is important to acknowledge that texts on surgery that were translated from Arabic to Latin in the twelfth and thirteenth centuries “had a life of their own, separate from the actual practice of surgery”, and often included procedures that no practitioner would consider attempting to perform³⁸. I believe that this is the case for the surgery on gynecomastia, which although it endured into western surgical manuscripts became a textual artifact without the expectation of practical application.

A close examination of Gerard of Cremona’s translation will be helpful.

Quandoque autem inflantur mamillae quorundam hominum apud complementum sompni. In quo incipiunt polliri in sompno donec assimilentur mamillas mulierum et remanent apostemose fede. Quando ergo abhorret illud aliquis, oportet ut secus super mamillas sectione lunari ex hanc formam ex linea b usque ad lineam g. Deinde excoria pinguedinem totam. Postea imple vulnus ex medicamento incarnativo. Deinde agrega duo labia vulneris cum sutura et cura ipsum donec sanetur. Si autem declinet mamilla ad inferiora et mollificatur propter magnitudinem suam sicut accidit mulieribus, tunc findatur in duobus lateribus suis superioribus duabus fissuris vel sectionibus similibus figure lunari quarum unaquaeque continuetur cum altera apud fines utriusque donec sit linea maior continens minorem secundum hanc formam ex linea b usque ad lineam g. Postea excoria cutem que est inter duo labia et aufer pinguedinem et administra quod diximus de sutura et pulveribus et quod est necessarium in curatione donec sanetur. Si autem non compleret inscisionem eius quod oportet te incidere secundum voluntatem vel virtutem infirmi aut propter fluxum sanguinis tunc oportet ut impleas vulnus toto submerso in unguento corrosivo et dimitte ipsum donec corrodatur illud quod remansit ex superfluitate et pinguetudine. Deinde cura ipsum donec sanetur. (Fig. 2)

Sometimes the breasts of certain men will be inflated upon waking up from dreams. When they begin to be polluted in their sleep they [their breasts] are made to resemble the breasts of women, and remain unsightly and swollen up. When someone finds this abhorrent, it is necessary to cut upon the top

Correcting unnatural breast

of the breasts in a half-moon shape, in this form, from b to g. Then scrape out all the fat. Then fill the wound up with a flesh-dissolving medication. Next, pull the lips of the wound together with sutures and let the place heal. However, if the breast hangs down low and becomes soft, because of its size, as happens to women, then it should be cut in two places on the top, into two cuts or sections, again like the figure of the moon, with one cut being joined to the other at the end, so that the larger line contains the smaller, in this way: from line b to line g. In this case, scrape out the skin that is between the two cuts and take out the fat, and administer (as we have said) sutures and powders, and whatever is necessary for the healing, so that it is healed. If you are not able to complete the incision that it is necessary for you to do, either because of the wishes or strength of the patient, or because of the flow of blood, then it is necessary to fill the wound up to the surface with a corrosive unguent and leave it there until it corrodes everything that remains from the extra skin and fat. Then treat it until it is healed.

Gerard's translation required him to add some explanation to his text. For example, al-Zahrawi had used an Arabic euphemism, "waking up from sleep", to refer to the onset of puberty³⁹. The phrase has the sense that a young man has had his first wet dream, indicating he is physically mature. Gerard translated it as "When sleep is finished (*complementum somnii*)", then added, "While the [young men] begin to be polluted in their sleep they [their breasts] are made to resemble the breasts of women and remain *apostemose* (swollen up)"⁴⁰. There is no mention of ugliness, simply a remark justifying why surgery might be necessary - that is, if someone finds the condition "abhorrent".

The rest of the treatment is clearly explained and illustrated with diagrams. The surviving Latin editions of al-Zahrawi's surgery come from Italy, and most of them also contain versions of illustrations of the surgery similar to the Arabic versions [Figures 2 and 3]⁴¹. These thirteenth-century manuscripts show close similarities to the illustrations in Marsh 54, an Arabic manuscript dated ca. 1271-2 in the Bodleian Library (Fig. 1), but they are stylized and drawn with a compass. Med. Msc. 8 of the Staatsbibliothek Bamberg (Fig. 2)

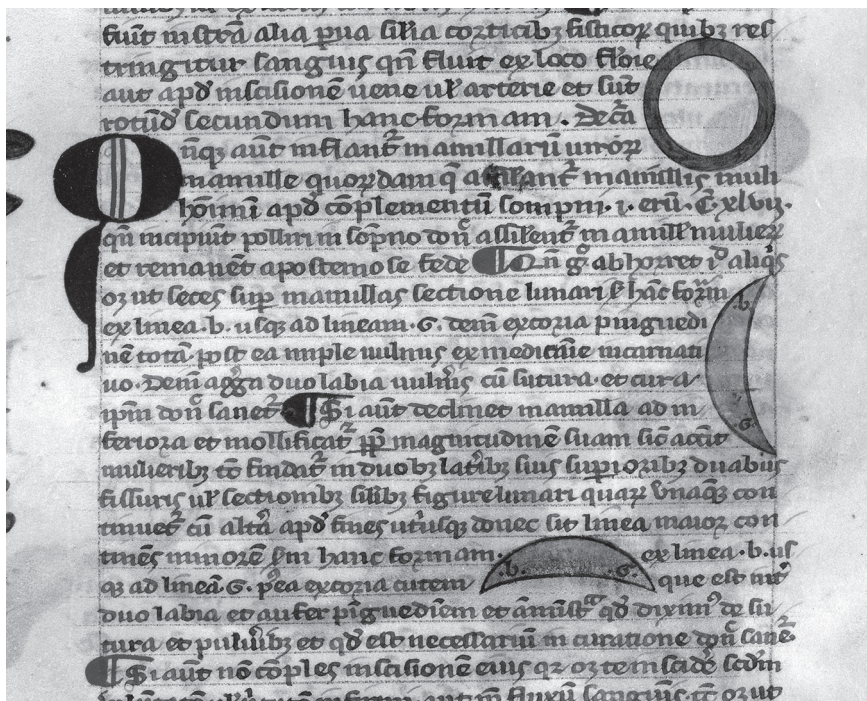


Fig. 2. Gerard of Cremona, Latin translation of al-Zahrawi's *Surgery*. Bamberg Staatsbibliothek Ms. Msc. Med. 8, fol. 10v (detail). 13th century.

has clear, shaded half-moon-shaped figures, while the version in the Bibliothèque Nationale's Latin 7127 (Fig. 3) has diagrams that are half circles. One of those half circles has a small circle representing the nipple. As in Marsh 54, the instructions direct the surgeon to incise from the letter b to the letter g, but this time the incision goes left to right, as a reader of Latin might read it. The literal translation and the copying of the diagrams pose the question of whether the surgery that al-Zahrawi had probably performed was also performed in Europe. It is unlikely, since the highly stylized qualities of the diagrams suggests copying for decoration rather than for use⁴². The illustrations did, however, convey the sense of al-Zahrawi's instruc-

Correcting unnatural breast

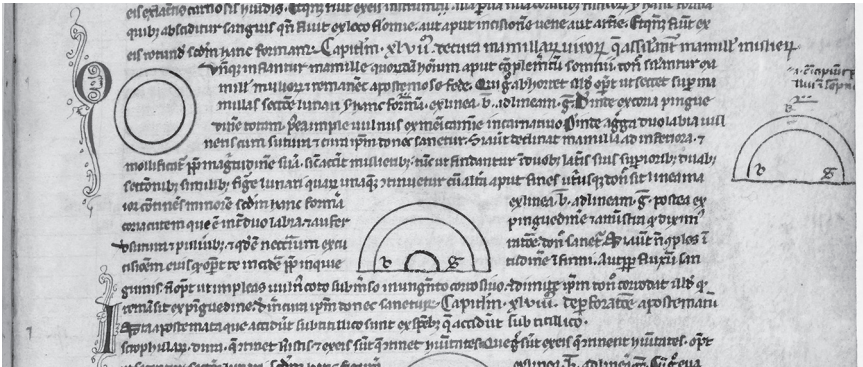


Fig. 3. Gerard of Cremona, Latin translation of al-Zahrawi's *Surgery*. Paris, Bibliothèque Nationale, Ms. Latin 7127, fol. 24r (detail). Third quarter of the 13th century.

tions. The next generation of gynecomastia texts gradually lost the illustrations as well as the practical instructions for the procedure. The gynecomastia text was duly adapted and copied by European surgical writers who used Gerard's Latin text as a resource. These included the thirteenth-century Italian surgeons Lanfranc of Milan (ca. 1250–1306), Bruno da Longoburgo (ca. 1200–1286) and Theodoric Borgognoni (ca. 1205–1298)⁴³. The text describing surgery for gynecomastia underwent a reinterpretation as the authors recorded what they thought was pertinent to from Gerard's translation of al-Zahrawi, Theodoric relying on Bruno's version, so that their texts have a virtually identical meaning. Lanfranc, on the other hand, completely rewrote the section to include a stronger opinion about the unnatural qualities of a man with breasts. All three authors agreed that the condition of gynecomastia was not a pathology requiring drugs or plasters, but a result of excess fat. Thus they determined gynecomastia to be both ugly and unnatural.

Lanfranc of Milan, *Magna Chirurgia*⁴⁴

Nimia pinguedo quo in virorum nascitur mamillis non curatur nisi cum manu. Quam in carne addita nihil operatur natura, quam carnis ablatione

est operi naturae contrarium. Propterea si mamilla viri adeo magna sit ut dependeat sicut mamilla mulieris, fac duas sectiones in inferiori parte mamille ad modum semicirculi sic ita: quod capita sectionis adinvicem coniugantur: et totam cutem cum superflua pinguidine auferas deinde suture et consolida sicut nosti. Si vero non est adeo magna ut descendat sufficit una sola lunaris incisio sic: C, et auferatur superfluum; postea solidetur.

When too much fat arises in men's breasts it cannot be cured except by hand. Just as the addition of flesh is not the work of nature, so too the removal of flesh must be done contrary to nature. Therefore, if the breast of a man is so great that it hangs down like the breast of a woman, make two incisions in the inferior part of the breast in the shape of a semicircle, thus so that the tops of the incisions join together, and after you take out all the superfluous fat from there then suture and close all the skin as you know [how]. If, however, there is not so much that the breast hangs down, a single moon-shaped incision like this: C, is enough, and take away the excess, and afterward let it and afterward let it heal.

Lanfranc's paraphrase was much closer to Paul's text than Gerard's translation; he reordered the section entirely and dropped the recommendation for the use of a caustic in the case of too much fattiness. Lanfranc emphasized the unnatural quality of gynecomastia and the need to correct the breast to make it more natural - in fact, to do nature's own work, although removing the fat that had grown there might seem an unnatural act. He reversed the order of the procedures, including the more complex procedure with two incisions before the less complex, which only has one. He also moved the site of the incision from the superior to the inferior side of the breast⁴⁵. Lanfranc's text is sometimes accompanied by a drawing in the shape of a simple semicircle identical to the ones accompanying Gerard's translations, though without the letters to give direction to the incision⁴⁶. The remarks about hemorrhage and caustics are gone, which is also true in the work of Bruno and Theodoric. Lanfranc was the only one of the Latin authors to place gynecomastia inside a larger section about problems of the female breast, and right next

to treatments for nursing women. Bruno paired the section with remarks on a case of lipoma, while Theodoric kept the subject in its own chapter.

The two sections of Bruno and Theodoric on gynecomastia are virtually identical.

Bruno da Longoburgo, *Chirurgia Magna*⁴⁷

Accidit autem quandoque inflatio quedam in ma mamillis [sic] quorundam virorum ita ut assimilentur mamillas mulierum quam natura nimis aborret. Et illud non est aliud nisi pinguedo. Cum ergo vis curare incide super mamillas sectione lunari et excoria illis pinguedinem et extrahe. Deinde adhibe vulneri medicamentum incarnativum et aggrega eius labia cum subtura et cura ipsum donec sanetur. Verumtamen si mamilla pendet inferius propter magnitudinem suam sicut mamilla mulieris tunc oportet ut scindatur a duobus suis lateribus superioribus duabus scissuris similibus figure lunari et una quoque earum continuetur cum altera aput finem suum deinde cutis que est inter duas scissuras excorietur et auferatur pinguedo et administratur subtura cureturque locus cum eo quod est necessarium donec sanetur. Ad si remansit aliquod de pinguedine propter intollerantium infirmi aut propter hambundantiam sanguinis tunc ponatur medicamen accutum donec corrodat.

There occurs a certain inflation sometimes in the breasts of certain men, so that they look like the breasts of women, which nature abhors very much. And this is nothing but fat. When you want to cure it, incise over the breasts in a moon-shaped section, and scrape out the fat and remove it. Then put a flesh-eating medication on the wound and pull together the lips with sutures and treat it until it is healed. Meanwhile, if the breast hangs down because of its large size, like a woman's breast, it is necessary that it be cut on both sides, on the top, in two cuts resembling the moon, one of which is connected with the other at the end. Then, the skin between the two cuts should be taken out, and the fat removed and a sewing be done. Let the place be taken care of with what is necessary so that it is healed. But if anything remains of the fat, because of the intolerance of the patient, or because of the abundance of blood, then put on a sharp medicine so that it is eaten away.

Theodoric Borgognoni, *Chirurgia*⁴⁸

In mamillis quorundam virorum accidit quandoque quedam inflatio ita ut assimiletur mamillis mulierum quam natura nimis abhorret et id nichil aliud est nisi pinguedo. Cum quo vis illud curare incide super mamillas sectione lunari et excoria pinguedinem ipsam et extrahe. Deinde ipsum incarna vulnus et aggrega eius labia cum sutura et cura ipsum donec sanetur. Verumtamen si ex mamilla propter magnitudinem suam pe[n]det inferius sicut mamilla mulieris tunc oportet ut scindatur a duobus suis lateribus superioribus duabus scissuris similibus figure lunari et qualis illarum continuetur cum altera apud finem suum. Deinde cutis que est inter duas scissuras excorietur et auferatur pinguedo et administretur necessarium donec sanetur. Quod si remansit aliquod de pinguedine propter intolleranciam infirmi aut propter habundanciam sanguinis tunc apponatur medicamen acutum donec corrodatur.

Sometimes a sort of inflation happens in the breasts of certain men, so that they become like the breasts of women, which nature abhors very much, and which is nothing but fat. When you want to cure this, make an incision over the breasts in a moon-shaped section and scrape out the fat there and remove it. Then, use a flesh-eating medication on the wound and attach the lips of the wound together with sutures and treat until it is healed. Nevertheless, if the breast hangs down low because of its large size, like the breast of a woman, then it is necessary that it be cut on both sides, on the top, in two cuts resembling the moon, one of which is connected with the other at its end. Then the skin between the two cuts should be taken out, and the fat removed. Let the place be treated with what is necessary so that it is healed. But if anything remains of the fat, because of the intolerance of the patient, or because of the abundance of blood, then let a sharp medicine be put on so that it is eaten away.

It is not difficult to see the similarities between these two texts, and also to see the ways in which their texts were more complex and followed Gerard's translation more closely than Lanfranc's. Bruno and Theodoric both kept the overall structure of Gerard's translation, but Bruno replaced Gerard's explanation of "waking up from sleep" and his remarks about pollution with simple remarks about what

“sometimes” happens to men. Bruno and Theodoric used stronger language than Gerard or Lanfranc to describe gynecomastia, writing that “nature greatly abhors” it. This is both a reflection of Paul of Aegina’s Galenic concern with the natural and unnatural and a gendered statement about what is proper to male and female. Nature, which, according to this view, designs the human body as an ideal that is both functional and beautiful, abhors and hates the possibility that a man might have breasts like a woman’s.

An interesting difference in the text is the word that Gerard of Cremona used to describe the swollen tissue of the breast. He used an adverb, *apostemose*, “like an aposteme”, or “swollen up”. An “aposteme” in the work of many writers is a boil, often caused by a wound or an infection, although the word can mean anything from a mild swelling to a cancerous lesion in the works of different authors⁴⁹. None of the three Latin surgical authors we are discussing used the word in this context, however, suggesting that they were avoiding describing the condition as a pathology that would require a physician⁵⁰. Avoiding the word “aposteme” allowed them to argue that the swelling of a young man’s breasts was “nothing but fat”⁵¹. They implied that it was possible to perform a simple surgery and to restore the man to a normal, non-abhorrent appearance: back to his natural state.

Manuscripts of Bruno and Theodoric did not always reproduce the illustrations that accompanied nearly all of Gerard’s versions⁵². Many manuscripts include only text (Fig. 4) and only one provides a pictorial illustration (Fig. 5)⁵³. In one example, an illustrated manuscript of Theodoric’s *Chirurgia*, the artist accompanied each chapter with a miniature of the condition represented. The qualities the artist has portrayed match the description in the text: Gerard of Cremona used “declinare” and Bruno and Theodoric used “pendere” to describe what the breast affected by gynecomastia looked like. These illustrations, however, are decorative rather than didactic. The tex-

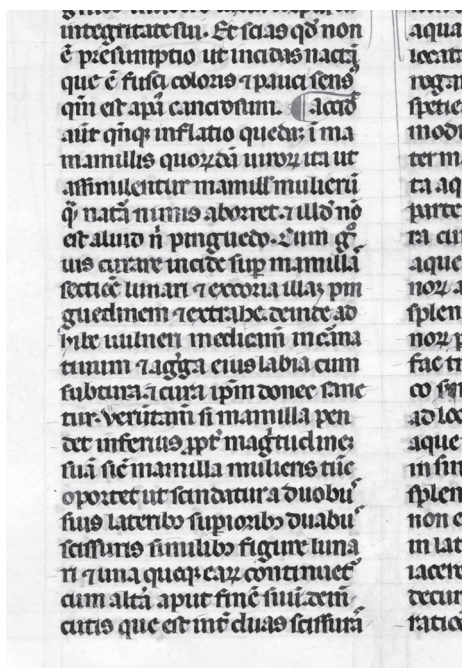


Fig. 4. Chirurgia Magna of Bruno da Longobucco, New Haven, Yale University, Cushing/Whitney Medical Library Ms. 28 Vault, page 905. Ca. 1300.

tual changes, the loss of the diagrams, and the simplification of the procedure suggest that although al-Zahrawi may have performed the surgery, it is unlikely that any of the Latin authors ever did.

We are left then with a question about why instructions for the surgical correction of gynecomastia survived into Latin writers' works if they were not performing the surgery. In addition to a possible desire to catalogue every kind of procedure, the key is in their statements about gender and the natural. Paul of Aegina's main concern in writing about gynecomastia was based in his knowledge of male castration as well as his discomfort with castrating men as an unnatural procedure. Breasts on a man were in an unnatural state whose secondary characteristics should justifiably be repaired with surgery;



Fig. 5. *Chirurgia* of Theodoric Borgognoni. Leiden, University Library, Ms. Vossius Latin F3, fol. 118r. 14th century.

the writers after Paul agreed with this assessment. Al-Zahrawi's concerns were less gender-based and more concerned with aesthetic appearance in a period when eunuchs were fewer. As Galen had expressed opposition to purely cosmetic procedures, the argument that gynecomastia was unnatural may have seemed more useful to the Latin writers to justify the surgical procedure's inclusion in their work. Their interest was not in the usefulness of the procedure but its philosophical import.

The protestations about the violation of natural balance might also be understood in the context of Greek and Latin writers' advice for reducing the breasts of young women who did not want large breasts, perhaps because larger breasts would make them look older. Purely cosmetic advice on repressing the growth of the breasts also appeared in Lanfranc's work, though the interventions he prescribed were not surgical. Paul of Aegina had remarked on this subject, "(Naxian whetstone) is said to be refrigerant, so as to suppress the breasts of virgins, and the testicles of children"⁵⁴. He included it in his section on care of the breasts as "a preservative of the breasts of virgins"⁵⁵. Lanfranc also advised binding the breasts up in a bandage with a poultice made of whetstone scrapings and sponging the breasts with vinegar and cinnamon. He included this piece of advice as well: "Let her that wishes that her breasts not be too large be careful, and neither touch them, nor allow them to be touched"⁵⁶. Such advice, however, does not seem to have justified the inclusion of discussions about the natural and unnatural; the degree of development of the breasts in young women did not cause the same kind of philosophical discomfort that gynecomastia did.

The inclusion of gynecomastia surgery in the Latin authors of the thirteenth century is not, in this case, an argument that the authors were performing the surgery itself or seeing it performed. The gradual disappearance of the details of the procedure from al-Zahrawi's description and the non-didactic quality of the illustrations is some evidence for this. However, the lack of eunuchs in 13th-century Christian Europe may also be a reason why this surgery did not occur; if Paul of Aegina was reacting to the presence of eunuchs, his procedure could have had (from his point of view) ample justification.

BIBLIOGRAPHY AND NOTES

- Abou Aly A, *The Wet Nurse: A Study in Ancient Medicine and Greek Papyri*. Vesalius 1996;2(2):86-97.
- Adams F (ed. and translator), *The Seven Books of Paulus Aegineta*. 3 vols. Publications of the Sydenham Society. London: Printed for the Sydenham Society; 1844.
- Bullough V, Brundage J (eds), *Handbook of Medieval Sexuality*. New York: Garland; 1996.
- Campbell E, Hansen J (eds), *The Surgery of Theodoric ca. A.D. 1267*. New York: Appleton-Century-Crofts; 1960.
- Cirurgia Guidonis de Cauliaco: De balneis porectanis. Cyrurgia Bruni. Theodorici. Rolandini. Rogerij. Lanfranci. Bertapalie. Jesu Hali de oculis. Lanamusali de baldac de oculis*. Venice: de Gregoriis; 1513.
- Cirurgia Guidonis de Cauliaco et Cyrurgia Bruni, Teodorici, Rolandi, Lanfranci, Rogerii, Bertapalie*. Venice: de Vitalibus; 1519.
- Gadepusch Bondio M, *Medizinische Ästhetik: Kosmetik und plastische Chirurgie zwischen Antike und früher Neuzeit*. Humanistische Bibliothek Reihe I, Abhandlungen Bd. 56. München: W. Fink; 2005.
- Gadelrab S, *Discourses on Sex Differences in Medieval Scholarly Islamic Thought*. *J Hist Med All Sci* 201;66(1):40-81.
- García-Ballester L, *Galen and Galenism: Theory and Medical Practice from Antiquity to the European Renaissance*. Aldershot: Ashgate/Variorum; 2002.
- Green M, *The Transmission of Ancient Theories of Female Physiology and Disease Through the Early Middle Ages (dissertation)*. Princeton NJ: Princeton University; 1985.
- Green M, *Moving from Philology to Social History: The Circulation and Uses of Albucasis's Latin Surgery in the Middle Ages*. In: Glaze F, Nance B (eds), *Between Text and Patient: The Medical Enterprise in Medieval and Early Modern Europe*. *Micrologus' Library* 39. Florence: SISMEL, Edizioni del Galluzzo; 2011. pp. 331-71.
- Green M, *Making Women's Medicine Masculine: the Rise of Male Authority in Pre-Modern Gynecology*. Oxford: Oxford University Press; 2008.
- Joshel S, *Nurturing the Master's Child: Slavery and the Roman Child-Nurse*. *Signs*. 1986;12(1):3-22.
- Karl L. *Theodoric de l'ordre des precheurs et sa Chirurgie*. *Bull soc France hist méd*. 1929; 29:140-83.
- King H. *Female Fluids in the Hippocratic Corpus: How Solid Was the Humoral Body?* In: Horden P, Hsu E (eds), *The Body in Balance: Humoral Medicines in*

- Practice, Epistemologies of Healing 13. New York: Berghahn Books; 2013. pp. 25-52.
- Liber medicinae, sive Regalis dispositio. Venice: Bernardinus Rizus; 1492.
- Ma N, Geffner M, Gynecomastia in Prepubertal and Pubertal Men. *Curr Opin Pediatr.* 2008;20(4):465-70.
- Manetti D, Medicine and Exegesis. In: Montanari F, Matthaios S, Rengakos A (eds), *Brill's Companion to Ancient Greek Scholarship. Vol. 2: Between Theory and Practice.* Leiden: Brill; 2015. pp. 1126-1215.
- May M (ed. and translator), Galen: On the Usefulness of the Parts of the Body (*De Usu Partium*). Ithaca NY: Cornell University Press; 1968.
- McVaugh M, *The Rational Surgery of the Middle Ages. Micrologus' Library 15.* Firenze: SISMEL-Edizioni del Galluzzo; 2006.
- McVaugh M, Surface Meanings: The Identifications of Apostemes in Medieval Surgery. In: Bracke W (ed.), *Medical Latin from the Late Middle Ages to the Eighteenth Century.* Brussels: Koninklijke Academie voor Geneeskunde van België; 2000. pp. 13-29.
- Meouak M, Saqâliba, Eunuques et esclaves à la conquête du pouvoir. Helsinki: Academia Scientiarum Fennica; 2004.
- Pagel J, Eine bisher unveröffentlichte lateinische version der Chirurgie der Pantegni nach einer Handschrift der Königl. Bibliothek zu Berlin. *Archiv für Klinische Chirurgie.* 1906;18(1):735-786.
- Pormann P, *The Oriental Tradition of Paul of Aegina's Pragmateia.* Leiden: Brill; 2004.
- Reusch K, Raised Voices: The Archaeology of Castration. In: Tracy L (ed.), *Castration and Culture in the Middle Ages.* Cambridge: D. S. Brewer; 2013. pp. 29-47.
- Ringrose K, *The Perfect Servant: Eunuchs and the Social Construction of Gender in Byzantium.* Chicago: University of Chicago Press; 2004.
- Sanders P, Gendering the Ungendered Body: Hermaphrodites in Medieval Islamic Law. In: Keddie N, Baron B (eds), *Women in Middle Eastern History: Shifting Boundaries in Sex and Gender.* New Haven: Yale University Press; 1991. pp. 74-96.
- Savage-Smith E, The Exchange of Medical and Surgical Ideas Between Europe and Islam. In: Greppin J, Savage-Smith E, Gueriguian J (eds), *The Diffusion of Greco-Roman Medicine into the Middle East and the Caucasus.* Delmar NY: Caravan Books; 1999. pp. 27-55.
- Savage-Smith E, The Practice of Surgery in Islamic Lands: Myth and Reality. *Soc Hist Med.* 2000;13(2):307-321.
- Savage-Smith E, Medicine. In: Rashed R (ed.), *Encyclopedia of the History of*

Correcting unnatural breast

- Arabic Science. Vol. 3: Technology, Alchemy and Life Sciences. London: Routledge; 1996. pp. 921-22.
- Segal R, Islam's Black Slaves: The Other Black Diaspora. New York: Farrar, Straus and Giroux; 2001.
- Spink M, Lewis G (eds), *Albucasis on Surgery and Instruments; a Definitive Edition of the Arabic Text with English Translation and Commentary*. Publications of the Wellcome Institute of the History of Medicine, New Ser., v. 12. London: Wellcome Institute of the History of Medicine; 1973.
- Tabanelli M (ed.), *The Surgery of Bruno da Longoburgo: An Italian Surgeon of the Thirteenth Century*. Rosenman L (translator), Pittsburgh, PA: Dorrance Publishing Co.; 2003.
- Trotter D, *Les Manuscrits Latins de la Chirurgia de Albucasis et la lexicographie médiéval*. *Archivum Latinitatis Medii Aevi* 2001;59:181-202.
- Tuten B, *Lactation and Breast Diseases in Antiquity: Medical Authorities on Breast Health and Treatment*. *Quaestiones Medii Aevi Novae* 2014;19:159-186.
- Ullmann M, *Islamic Medicine*. Watt J (translator), *Islamic Surveys* 11. Edinburgh: Edinburgh University Press; 1978.
- Wilson J, Roehrborn C, *Long-Term Consequences of Castration in Men: Lessons from the Skoptzy and the Eunuchs of the Chinese and Ottoman Courts*. *J Clin Endocrinol Metab*. 1999;84(12):4324-31.

1. Ma N, Geffner M, *Gynecomastia in Prepubertal and Pubertal Men*. *Curr Opin Pediatr*. 2008; 20(4):465-70.
2. Ullmann M, *Islamic Medicine*. Watt J (translator), *Islamic Surveys* 11. Edinburgh: Edinburgh University Press; 1978. pp. 8-12.
3. García-Ballester L, *Galen and Galenism: Theory and Medical Practice from Antiquity to the European Renaissance*. Aldershot: Ashgate/Variorum; 2002. pp. 36-39.
4. On the ancient Greek concept of the body see King H, *Female Fluids in the Hippocratic Corpus: How Solid Was the Humoral Body?* In: Horden P, Hsu E (eds), *The Body in Balance: Humoral Medicines in Practice*. *Epistemologies of Healing* 13. New York: Berghahn Books; 2013. pp. 25-52. On ancient views of the breast see also Tuten B. *Lactation and Breast Diseases in Antiquity: Medical Authorities on Breast Health and Treatment*. *Quaestiones Medii Aevi Novae* 2014;19:164-69.
5. Galen, *De usu partium* XV.2.395. In: May M (ed. and translator), *Galen: On the Usefulness of the Parts of the Body (De Usu Partium)*. Ithaca NY: Cornell University Press; 1968. vol. 2, p. 673.

6. On ancient wet nursing see Abou Aly A, *The Wet Nurse: A Study in Ancient Medicine and Greek Papyri*. Vesalius 1996;2(2):86-97. Joshel S, *Nurturing the Master's Child: Slavery and the Roman Child-Nurse*. Signs 1986;12(1):3-22.
7. Pormann P, *The Oriental Tradition of Paul of Aegina's Pragmateia*. Leiden: Brill; 2004. pp. 311-12.
8. Adams F (ed. and translator), *The Seven Books of Paulus Aegineta*. Publications of the Sydenham Society. London: Printed for the Sydenham Society; 1844. vol. 1, pp. xvii-xviii.
9. Pormann P, ref. 7, pp. 311-13. Savage-Smith E, *The Practice of Surgery in Islamic Lands: Myth and Reality*. Soc Hist Med 2000;13(2):309.
10. Savage-Smith E, ref. 9, pp. 310-314.
11. Paul of Aegina, book 6 sect. 46. In: Adams F, ref. 8, vol. 2, p. 334. For the Greek text see *Corpus Med Graec*. IX.2, p. 112.
12. Ringrose K, *The Perfect Servant: Eunuchs and the Social Construction of Gender in Byzantium*. Chicago: University of Chicago Press; 2004. p. 56.
13. Gadebusch Bondio M, *Medizinische Ästhetik: Kosmetik und plastische Chirurgie zwischen Antike und früher Neuzeit*. Humanistische Bibliothek Reihe I, Abhandlungen Bd. 56. München: W. Fink, 2005. pp. 31-69.
14. Paul of Aegina, Book 6 sect. 70. In: Adams F, ref. 8, vol. 2, p. 381. For the Greek text see *Corpus Med Graec*. IX.2, p. 112.
15. Ringrose K, ref. 12, p. 59.
16. *Ibid.*, pp. 60-61.
17. Paul of Aegina, book 6 sect. 68. In: Adams F, ref. 8, vol. 2, p. 379.
18. *Ibid.*, vol. 2, p. 379.
19. Paul of Aegina, book 6 sect. 59, in Adams F, ref. 8, vol. 2, p. 381.
20. Reusch K, *Raised Voices: The Archaeology of Castration*. In: Tracy L (ed.), *Castration and Culture in the Middle Ages*. Cambridge: D. S. Brewer; 2013. pp. 36-38.
21. Ringrose K, ref. 12, p. 63.
22. Wilson J, Roehrborn C, *Long-Term Consequences of Castration in Men: Lessons from the Skoptzy and the Eunuchs of the Chinese and Ottoman Courts*. J Clin Endocrinol Metab. 1999;84(12):4324-31. On castration in European history in general, see Bullough V, Brundage J (eds), *Handbook of Medieval Sexuality*. New York: Garland, 1996. pp. 279-306. Reusch K, ref. 20.
23. Savage-Smith E, *Medicine*. In: Rashed R (ed.), *Encyclopedia of the History of Arabic Science*. Vol. 3: Technology, Alchemy and Life Sciences. London: Routledge; 1996. pp. 919-921.

Correcting unnatural breast

24. For Constantine's version see Pagel J, Eine bisher unveröffentlichte lateinische version der Chirurgie der Pantegni nach einer Handschrift der Königl. Bibliothek zu Berlin. *Archiv für Klinische Chirurgie* 1906;18(1):753. For Stephen of Antioch's version, see Haly Abbas. *Liber medicinae, sive Regalis dispositio*. Venice: Bernardinus Rizus, 1492. *Practica*, book 9 chapter 40. p. 164. Both works use the term *turpitude*, "ugliness", to describe gynecomastia.
25. On the surviving manuscripts of this work see Spink M, Lewis G (eds), *Albucasis on Surgery and Instruments; a Definitive Edition of the Arabic Text with English Translation and Commentary*. Publications of the Wellcome Institute of the History of Medicine, New Ser., v. 12. London: Wellcome Institute of the History of Medicine; 1973. p. xii.
26. *Ibid.*, pp. 362-365. Emilie Savage-Smith has explored the procedures she believes al-Zahrawi may have attempted. Savage-Smith E, ref. 9. pp. 310-314.
27. Spink M, Lewis G (eds), ref. 25, pp. 362-63. I am indebted to Dr. Carol Stamm for this explanation of breast reduction. On al-Zahrawi's surgery for breasts see also Chavoushi S. et al., *Surgery for Gynecomastia in the Islamic Golden Age: Al-Tasrif of Al-Zahrawi (936–1013 AD)*. *ISRN Surgery* 2012:1-5.
28. Spink M, Lewis G (eds), ref. 25, pp. 362-63.
29. Spink M, Lewis G (eds), ref. 25, pp. 456-57.
30. On the evidence for eunuchs in Muslim Spain see Meouak M. *Saqâliba, Eunuques et esclaves à la conquête du pouvoir*. Helsinki: Academia Scientiarum Fennica; 2004. Segal R, *Islam's Black Slaves: The Other Black Diaspora*. New York: Farrar, Straus and Giroux; 2001. p. 80.
31. Savage-Smith S, ref. 23, p. 946. al-Zahrawi in: Spink M, Lewis G, ref. 25, pp. 452-53.
32. al-Zahrawi in: Spink M, Lewis G, ref. 25, pp. 454-55.
33. Sanders P. *Gendering the Ungendered Body: Hermaphrodites in Medieval Islamic Law*. In: Keddie N, Baron B (eds), *Women in Middle Eastern History: Shifting Boundaries in Sex and Gender*. New Haven: Yale University Press; 1991. pp. 56-68.
34. Gadelrab S. *Discourses on Sex Differences in Medieval Scholarly Islamic Thought*. *J Hist Med Allied Sci* 2011;66(1):80.
35. On the complex Latin tradition of al-Zahrawi's work see Green M, *Moving from Philology to Social History: The Circulation and Uses of Albucasis's Latin Surgery in the Middle Ages*. In: Glaze F, Nance B (eds), *Between Text and Patient: The Medical Enterprise in Medieval and Early Modern Europe*. *Micrologus' Library* 39. Florence: SISMEL, Edizioni del Galluzzo; 2011.

- pp. 331-72. Trotter D, *Les Manuscrits latins de la chirurgia d'Albucasis et la lexicographie du latin médiéval*. *Archivum Latinitatis Medii Aevi* 2001;59:181-202.
36. McVaugh M, *Surface Meanings: The Identifications of Apostemes in Medieval Surgery*. In: Bracke W (ed.), *Medical Latin from the Late Middle Ages to the Eighteenth Century*. Brussels: Koninklijke Academie voor Geneeskunde van België; 2000. pp. 13-29.
 37. See Green M, *Making Women's Medicine Masculine: The Rise of Male Authority in Pre-Modern Gynaecology*. Oxford: Oxford University Press; 2008.
 38. Savage-Smith E, *The Exchange of Medical and Surgical Ideas Between Europe and Islam*. In: Greppin J, Savage-Smith E, Gueriguian J (eds), *The Diffusion of Greco-Roman Medicine into the Middle East and the Caucasus*. Delmar NY: Caravan Books; 1999. p. 39.
 39. al-Zahrawi in: Spink M, Lewis G, ref. 25, pp. 362-63. Savage-Smith writes that surgical procedures' "translation into Latin added yet another layer of obscurity to them", for which this example is certainly true. Savage-Smith E, ref. 38, p. 46.
 40. "In quo incipient polliri in sompno donec assimilenter mamillas mulierum et remanent apostemose fede". Bamberg, Staatsbibliothek Msc. Med. 8, fol. 10v (see fig. 1).
 41. Green M, ref. 35. p. 336.
 42. Savage-Smith E, ref. 38, p. 48.
 43. Tabanelli M (ed.), Rosenman L (translator), *The Surgery of Bruno da Longoburgo: An Italian Surgeon of the Thirteenth Century*. Pittsburgh, PA: Dorrance Publishing Co.; 2003. Campbell E, Hansen J (eds), *The Surgery of Theodoric ca. A.D. 1267*. New York: Appleton-Century-Crofts, 1960. The development of these texts has been carefully traced by Michael McVaugh. McVaugh M, *The Rational Surgery of the Middle Ages*. *Micrologus' Library* 15. Firenze: SISMEL-Edizioni del Galluzzo; 2006. pp. 16-32.
 44. *Cyrurgia Guidonis de Cauliaco et Cyrurgia Brunii, Teodorici, Rolandi, Lanfranci, Rogerii, Bertapalio*. Venice: de Vitalibus; 1519. fol. 194v-195r.
 45. The similarities between Paul's text and Lanfranc's are striking, and lead to the question of whether Lanfranc knew Paul's text directly. This is impossible to prove, though there was an eleventh-century Latin version of Paul at Monte Cassino by this time. The manuscript is Monte Cassino codex 351. Green M, *The Transmission of Ancient Theories of Female Physiology and Disease Through the Early Middle Ages* (dissertation). Princeton NJ: Princeton University; 1985. p. 213.

Correcting unnatural breast

46. *Cirurgia Guidonis de cauliaco: De balneis porectanis. Chirurgia Brunii. Theodorici. Rolandini. Rogerij. Lanfranci. Bertapalie. Jesu Hali de oculis. Lanamusali de baldac de oculis...* Venice: de Gregoriis; 1513. fol. 194v. This 1513 edition has the semi-circle upside down from the angle a practitioner would need for the directions in the text to make sense.
47. New Haven, Yale University, Harvey Cushing/John Hay Whitney Medical Library Ms. 28 Vault, p. 905.
48. Leiden, Universiteits Bibliotheek, Ms. Vossius Latin F3, fol. 118r.
49. McVaugh M, ref. 43.
50. Theodoric, *Chirurgia*, III.30. In: Campbell E, Hansen J, ref. 43, vol. 2, p. 91; Bruno, *Chirurgia Magna*, II.6. In: Tabanelli M, ref. 43, p. 68.
51. Theodoric, *Chirurgia*, III.32. In: Campbell E, Hansen J, ref. 43, vol. 2, p. 93; Bruno, *Chirurgia Magna*, II.6. In: Tabanelli M, ref. 43, p. 68.
52. Green M, ref. 35, pp. 343-44. Green points out that there are thirty-three extant copies of al-Zahrawi's work in Latin and suggests that their illustrations may have been one of the reasons for their apparent popularity. Only one extant manuscript of Bruno's *Chirurgia Magna* has some illustrations: Milan, Biblioteca Ambrosiana Ms. 59 sup. See Tabanelli M, ref. 43, p. xxiii.
53. On the manuscripts of Theodoric see Karl L, *Theodoric de l'ordre des precheurs et sa Chirurgie*. *Bull soc France hist méd* 1929;29:140-83.
54. Paul of Aegina, book 7 section 3, in Adams F, ref. 8, vol. 3, p. 505.
55. *Ibid.*, vol. 1, 505.
56. *Cirurgia Guidonis de Cauliaco et Chirurgia Brunii*, 1519, ref. 44, fol. 294v.

Revised: 10.12.2019

Accepted: 30.11.2020

