Review Article

Hermaphroditism, surgical reconstruction of the anatomy of the gonads in ancient Greece as described by Diodorus Siculus (ca 80-20 BC)

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Abstract

Background: Ancient Greek medico-philosophers comprehended a series of genitalia disorders and were able to perform surgical operations for their correction. Although researchers believe that the first plastic surgery of pseudo-hermaphroditism was performed by Persians in 11th century AD, a series of intersex individual cases were reported in the work of the ancient Greek historian Diodorus Siculus.

Methods: Bibliographical study of Diodorus' treatises.

Results: The report of a patient named Callo, who was raised as a female and was surgically transformed into a young male, was included in Diodorus' works. Diodorus described that the operation was performed surprisingly by a pharmacist, testifying the extent and depth of medical knowledge among ancient Greeks. The operation included cicatrization and placement of an artificial urethra in the non-perforated penis.

Conclusions: The operation was for the era an innovative procedure ahead of its time, a hallmark of cosmetic and plastic surgery.

Keywords: Greece, plastic surgery, pseudo-hermaphroditism

Introduction

The exact dates of Diodorus Siculus' (Greek: Διόδωρος Σικελιώτης) (Figure 1) birth and death cannot be exactly established. However, there are several clues in his work unveiling the era when he had probably flourished. The ancient Greek historian and writer was born in

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Agyrium on Sicily, was most probably of a noble origin, as he mentioned no patron at all, and wealthy, as he could afford to spend thirty years reading and writing his masterpiece “Library of World History” (Greek: Ιστορική Βιβλιοθήκη, Figure 2). Inside his huge treatise, he described a series of surgical operations concerning intersex people [1]. This fact alone may imply not only the existing knowledge on hermaphroditism but also the consideration of its correction as a surgical achievement and an essential for the determination of both sex and gender.

Figure 1. Diodorus Siculus, portrait, Spanish-Arab gravure, 17th century.


Hermaphroditus (Ερμαφρόδιτος) (Figure 3) was the son of Hermes and Aphrodite, who was a handsome young man when the water nymph Salmacis fell in love with him and wished to be united with him in eternity (Figure 4). Thus, a peculiar union of body and soul gave birth to a merged sex beautiful creature. Aphroditos, a female Aphrodite with male genital was worshiped as a god in ancient Greece since the archaic period [2,3]. Traces of the cult were found in Cyprus, while in Athens, comic playwright Aristophanes (ca 445-380 BC) mentioned the three sexes, the male (andras), the female (gyne), and the androgynous (blended) [4]. Ancient Greek and Roman scholars wrote about hermaphrodites. Thus, Roman poet Publius Ovidius Naso (ca 43 BC-18 AD) noted a series of six sexes change in his treatises “Metamorphosis” [3], Roman historian Titus Livius (59/64 BC-17 AD) wrote for monstrous children with two sexes and 16 cases of hermaphroditism (Figure 5) [5], and Roman author and philosopher Plinius (23-79 AD) described individuals presenting androgynism [6,7]. The first case of a famous intersex figure was Favorinus of Arelate (ca 80-160 AD), a Roman sophist and philosopher whose work survived in fragments only by other authors [8-10]. Sophist Marcus Antonius Polemon, also known as Polemon of Laodicea (ca 90-144).
a specialist on physiognomy, described Favorinus as beardless and with a high-pitched, shrill, thin voice, with the features that nature bestows on eunuchs, noting that he was "a eunuch born without testicles" [11], while Philostratus described him as a hermaphrodite [9]. Although hermaphrodites as individuals were known in ancient Greco-Roman word, surgical procedures for sex change in Greek antiquity were first mentioned by Diodorus Siculus, who among the gathered and described cases of androgyny included this of Callo (Greek: Καλλών), as the most intriguing report concerning the sex alternation.

![Figure 3. Statue of Hermaphroditus](image1)

**Figure 3.** Statue of Hermaphroditus (watch carefully the genitalia), son of Hermes and Aphrodite, around 130-150 AD, from Egypt, Louvre Lens, France.

![Figure 4.](image2)

**Figure 4.** Francesco Albani, Salmacis and Hermaphroditus, ca. 1645-1650, oil on canvas, Turino, Galleria Sabauda 89.

Although the authors do not agree with the opinion of a stigmatized person when is referred as hermaphrodite [12], believing in the very essence of the ancient Greek meaning, with respect to the general views we declare that we only mention it as a historical term. Our manuscript studies Diodorus’ treatise, in an effort to describe the first mentioned surgical interventions concerning sex alternation.

**The Story and the Operation of Callo**

Diodorus described the case of Callo as follows, “There was an Epidaurian, Callo, an orphan who was supposed to be a girl. Now the orifice with which women are provided, had in her case no opening, but besides the so-called pecten (pubis) she had a congenital
perforation (fistula) through which she excreted the liquid residues. On reaching maturity she became the wife of a fellow citizen. For two years she lived with him, and since she was incapable of intercourse as a woman, was obliged to submit to unnatural embraces. Later, an inflammation (or tumor) appeared on her genitals, giving rise to great pain. A plethora of physician was called in, but none promised a cure. A pharmacist, though, tried an intervention. He cut into the swollen area, whereupon a man’s privates protruded. He discovered a pair of testicles and a non-perforated penis. He took steps to remedy the remaining deficiencies. Cutting into the glans penis first, he created a passage towards the urethra, inserting a silver artificial urethra (catheter). He drew off the liquid residues. Then, by scarifying the perforated area, he brought the parts together closing the fistula. The pharmacist demanded a double fee, as he undertook a case of a sick female and delivered a cured young male, named Callo (Greek: Καλλών)” [1].

Figure 5. Hermaphrodite (watch carefully the genitalia), Roman fresco, Pompeii, 1st century AD.

Discussion

Apparently, the described sex change surgical procedure, though a minor local operation, presented a series of barriers considering incisions, antiseptics, and hemorrhage. However, surgery was a well-established medical field since the era of Asclepieia [13,14] and thrived during the Classical era, as thoroughly described in Corpus Hippocraticum [15]. A plethora of extremely difficult and complicated for the era operations was mentioned, such as cranial trepanation, thoracotomy, and abdominal surgery combined with endotracheal intubation and parenteral nutrition, performed with fine surgical instruments, as well as the application of antiseptics [14-17]. A series of sophisticated for the era surgical instruments were available, arranged in medical boxes, including various pliable catheters for diverse usage (Figure 6) [15,18,19]. Moreover, a series of archaeological findings and fragments in ancient treatises document extensive understanding of the diseases of the genital organs by the ancient Greek physicians who performed surgical operations of the genitalia [20-25]. A series of penile surgical procedures were described in the era when Diodotus lived. Thus, for penile tumors, both benign (condylomata, acrochordon, etc.) and cancerous, the ancient Greeks recommended a surgical excision, while they emphasized on the value of a supplementary cauterization or chemical burning with the application of caustics, in order for a relapse to be avoided. Penectomy, various types of penile reconstruction and preservation of the urethra, surgical correction of phimosis and interventions on hypospadias were also described, mainly attributed to the Greek surgeons Heliodorus from Egypt (1st century AD) and Antyllus from Rome (2nd century AD) [26-28].

The case of young Callo implied that she was apparently born with ambiguous or female external genitalia (fistula as urethra) and had been raised as a female during childhood. However, Diodorus clearly noted the existence of male genitalia discovered after the plastic surgery (inguinal, pubic area?). This was most probably a case of cryptorchidism manifesting as heterosexual puberty and male pseudo-hermaphroditism. A patient who failed to develop male sexual characteristics during childhood, due to relatively low androgen levels, but with an impressive transformation with the rapid development of male secondary sexual characteristics during puberty, due to the presence of high levels of active androgens [29].
In ancient Greece, the "one sex body" was a concept that defined societal gender relations. The transformation of a woman-non-penetrator, thus by definition a female gender to a man-penetrator, by definition a male gender, constituted an unprecedented ideological dispute and societal threat. Furthermore, androgynous individuals were considered as "terata" (Greek: τέρατα, monsters), transformed as a result of divine punishment for their deeds (Figure 7) [30]. Diodorus, stating that it was impossible for male and female natures to be unified into a bisexual one, found a strategy for undermining the superstition surrounding the appearance of the androgynous individuals. He demonstrated that pseudo-hermaphroditism was a natural phenomenon, a disorder which could be corrected by means of surgery, so that the patient could regain a respectable place in society. Diodorus succeeded in that hermaphrodites, who once were worshiped as divine entities, were considered no longer as terrifying prodigies or freaks of nature [31].

Some researchers believe that the first surgical interventions concerning male pseudo-hermaphroditism were performed by the Persian-Arab physician and surgeon Al-Zahrawi (Latin: Abulcasis, 936-1013 AD) [32]. However, detailed analysis of the works of Diodorus Siculus indicates that sex change operations (female to male in our case) were performed during the 1st and 2nd centuries BC in ancient Greece [33]. It seems that independently of the type of the operation, plastic, reconstructive, or cosmetic, the ancient Greek surgery introduced unimaginable for the era techniques [34].

**Conclusion**

In Greek antiquity, hermaphrodites were recognized as a deviation from the natural order, while in some cases were worshiped as gods. The ancient Greek medico-philosophers were experienced in genitalia disorders, able to perform surgical interventions separating theurgical therapeutics, magic, and superstition from real medicine. In the work of Diodorus Siculus a description of a female to male
surgical correction was described, which in the case of Callo, a pseudo-hermaphrodite, this was the first documented surgical delineation of its kind.

**Conflict of interest**
The authors declare no conflict of interest.

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**References**