



Pioneers in surgery

The first shoulder replacement in Ancient Greek Mythology: The story of Pelops, King of Elis

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ABSTRACT

Medical science and the need for the treatment of diseases and injuries, is as old as human history. This research aims to identify and study the first registered shoulder replacement in Ancient Greek Mythology. After a review of literature, the texts that referred to the myth of Pelops' ivory shoulder were identified and analysed, as were the texts which contain the first citation for shoulder replacement in the prehistoric era.

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1. Introduction

The beginning of medical science is lost in the depths of human history. Indications for medical cases exist from ancient times. Nascent prosthetic science was beginning to emerge in the Nile valley [1]. Probably, the oldest known medical treatises (of orthopedic nature) are cited in the Edwin Smith surgical papyrus (the original dates from about the 30th century B.C) [2] and in a depiction (the scene is suggested to represent reduction of a dislocated shoulder) in the tomb of Ipwy (Egypt) [3]. Furthermore, characteristic is a successful cranial surgical intervention on an adult female individual; involving head trauma at the right occipito-parietal region carried out during the second half of the 7th century B.C. the Archaic Period in Abdera, Greece [4,5].

The current research examines the period that dates back to prehistoric times, and the finding of tangible evidence was not possible. The majority of the knowledge for this era is primarily derived from myths. Ancient myths are significant because they refer to indications of medical interventions. Such is the myth regarding the birth of goddess Athena. According to the myth, Zeus suffered from headaches and called on Hephaestus to help him. In order to treat him, Hephaestus hit Zeus in the head with an axe and Athena sprang forth from Zeus' head [6,7]. This myth may involve a case

of intracranial pressure and decompression of the head by craniotomy. An example of the above mentioned myth (which contains a scenario of divine intervention) can be seen in the illustration of an Archaic Greek, lip-cup [8], which shows the birth of Athena following the blow to head of Zeus from Hephaestus [7].

2. Hypothesis

The myth of Pelops' ivory shoulder can be considered as the first citation for shoulder replacement in Greek Mythology-prehistoric era.

3. Material – Methods

The present study was based on relevant literature. We studied the myth of “The Cutting of Pelops” (Greek: “Κρεουργία Πέλοποζ”), as told by the ancient writers, P. Ovidius Naso (known as Ovid) [9], Apollodorus [10], Pausanias [11], Pindar [12], P. Vergilius Maro (known as Virgil or Vergil) [13] and Pliny the Elder [14]. The main objective of this article is to find, analyse and finally to substantiate indications of the first shoulder replacement in Greek Mythology. In order to succeed in this objective, ancient literature was reviewed in relation with scientific data from modern bibliography. The knowledge contained in the texts of the myth of Pelops' ivory shoulder is presented in an analytical modus. A study of the literature including the depictions of the ancient pottery was done. The findings of the research support the thesis that this myth

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contains the first citation concerning prosthetic medicine (shoulder prosthesis) in Ancient Greek Mythology.

4. Results

The story of Pelops, King of Elis.

According to the genealogical tree of Pelops, he was the son of Tantalus, who was a son of Zeus [15]. According to mythology, Pelops came to Greece from Asia Minor and after having arrived in Pisa, competed in a chariot race against the king of Pisa, Oinomaos. The prize of the race was the hand of the king's only daughter Hippodameia. Pelops won the race, during which the king was killed, and eventually married the king's daughter and became himself king process [16]. Pelops is often credited with founding the Olympic Games, which, according to legend, were instigated by the above mentioned chariot race (Pind. 01. 1.67 88) [17].

Preparations for the chariot race between Oinomaos and Pelops is portrayed in the east pediment of the magnificent temple of Zeus in Olympia [17]. According to Pausanias, the pediment depicts Zeus placed in the center and has Pelops (the unbearded male) with Hippodameia on one side and Oinomaos (bearded) with Sterope on the other [17,18]. Pelops became a great king, and gave his name to the Peloponnesus, "island of Pelops".

Regarding the myth behind the shoulder of Pelops, his father Tantalus, son of Zeus, invited the Olympian Gods to a banquet. In order to test the gods, Tantalus slaughtered his young son Pelops [9,10] and cooked his remains as a sacrifice for the gods to eat, to see if they would notice [9,19]. The gods became aware of this unacceptable practice (human sacrifice, anthropophagy, cannibalism was not a common practice in ancient Greece), and did not eat the offering; only goddess Demeter, in sorrow for her daughter being abducted by Hades, did not realize the content of the sacrifice and ate one of the remains (the shoulder) of Pelops (others have claimed that sea nymph Thetis was the one who ate the shoulder of Pelops) [19].

Zeus, the mightiest of the Olympian gods, ordered Hermes to bring the remains of Pelops in a sacred cauldron, and restored him back to life and to his former appearance [9,19]. P. Ovidius Naso writes: "[...] it is said that the gods fitted his limbs together again. They found the pieces, but one was lost, between the upper arm and the neck. Ivory was used in place of the missing part, and by means of that Pelops was made whole" [9]. When the process was over, Clotho (one of the Three Fates) took him out of the kettle [12,20].

According to one writer, the ivory was made by Demeter [19]. According to another reference, Pelops' ivory shoulder replacement was made for him by Hephaestus [21]. Hephaestus made an ivory shoulder and replaced the missing of flesh with the ivory. The artificial ivory bone inserted into Pelops' shoulder was passed on to his future generations (οι από Πέλοποζ καταγόμενοι τοιούτου ειχον τον ὤμον "those descended from Pelops have such a shoulder" Heyne, 1807: Schol. Olymp. 1, 38) [22].

According to the study, the only reliant depiction of the myth is illustrated in an Etruscan mirror, which is cited in the museum of Louvre [23]. The right side of the mirror depicts a cauldron from which a young naked man, Pelops, is emerging [24]. Pelops after divine intervention replaced his ivory shoulder and is whole and healthy again.

Taking the above under consideration, the ancient writers, referring to the myth of Pelops' cutting up (Greek: "Κρεοουργία Πέλοποζ"), provide the indications of the first shoulder replacement in Greek Mythology. Feldman (2006) supports the thesis that Demeter created a splendid ivory replacement for Pelops, thereby atoning for her sin and accomplishing the first shoulder arthroplasty [25].

According to Pausanias, many years later, Damarmenus, a fisherman from Eretria, cast a net into the sea and drew up the shoulder blade of Pelops and gave it back to the Eleans. The blade, which was exhibited in ancient Olympia, had disappeared by Pausanias' time, because it had been hidden in the depths so long, and besides its age it was greatly decayed through the salt water [26].

5. Discussion

Mayor (2000) writes that the bone which Damarmenus netted may have come from a large Pikermi-type mammal, perhaps a mastodon, rhinoceros or other [27]. Auxiliary to this thesis is the fact until nowadays large prehistoric mammal bones are found in the sea. Fishermen in the English Channel and the North Sea hauled thousands of mammoth bones [27]. Kenneth Lapatin, an expert on ivory in antiquity presents that very old bone can resemble ivory, especially when it is polished [27]. The anterior in conjunction with: a) the belief for Pelops outsized shoulder blade (displayed in sacred Olympia) [28], b) the suchlike shape of the human scapula (shoulder blade) to that of the elephant, support the thesis of Mayor that a large fossil elephant scapula (Mammuthus primigenius) from southern Greece, may have been enshrined as the shoulder bone of giant hero Pelops [29]. Griffith (2000) writes it is more likely that the bone came from one of the sacrificial animals offered to Pelops, traditionally a black ram [30].

The hypothesis indicates that when Pelops was put inside the cauldron-"λέβητοζ", the Gods hospitalized him. The cauldron maybe represents the necessity for a surgical room where an operation must take place. The myth itself may conceal elements necessary for a medical intervention. The story proves that the ancient Greeks realized that, in order to achieve a body prosthesis, a God is needed to take pieces from bones (ivory) corresponding in shape and size to the piece shoulder cut by Tantalus and to fit them to the injured spot. Such activities have not been mentioned in the prehistoric era; as surgery of this nature was not a common practice.

The various versions of the legend of Pelops' ivory shoulder provide evidence of people's desire for surgical operations in early history. The surgery was so difficult from its nature that it required help from the Gods, a divine intervention. There existed a belief among ancient Greeks about the medicinal virtues which the bone possessed [31]. The myth of Pelops is symbolic and suggesting that even in the primitive human the need for medical treatment existed and the Gods were called upon to do their duty to save man.

The legend of "Κρεοουργία Πέλοποζ" has a tremendous impact, due to the fact that there were no technical capabilities (surgery room, etc) and medical tools, the primitive man realized that he had to develop medicine, initially as magic, then as an art and finally as a science. The severity and difficulty of the procedure was so serious that it required divine intervention. The presence of the Gods in such a difficult surgery is symbolic, the hero Pelops is made whole again from Gods volition, from divine intervention.

6. Conclusion

It is unknown if the events that ancient writers have reported occurred. The current study has not found any depiction in ancient pottery, of Pelops cutting. Human sacrifices were not a common practice in the classical age, and if existed, it was solely in the prehistoric age. Furthermore, during this period there is no evidence of replacement of skeletal parts. No image was found of Pelops' shoulder prosthesis. It is most likely that interventions of this nature have never happened, but in these texts, for the first time, a case of shoulder replacement is mentioned. The human desire to replace lost parts of the human body with other ones

so that it becomes whole and functional again, is first recorded in history, in the aforementioned records. According to an extensive analysis of the hypothesis it is concluded that the legend of Pelops (Greek: “Κροουργία Πέλοποζ”), contains indications of the first recorded shoulder replacement in Ancient Greek Mythology and constituted the stimulus for the primarily formation of prosthetic medicine as a science.

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Contribution

NNN designed the review and collected the data. NNN wrote the manuscript, which was approved by all authors. YCK conceived the project and collected the data. All authors contributed by editing and reviewing the manuscript. All authors have read and approved the final manuscript.

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