Limb Amputation in Ancient Egyptians from Old Kingdom

1Moushira E. Zaki, 1Azza M. Sarry El-Din, 1Muhammad Al-Tohamy Soliman, 2Neveen H. Mahmoud,
1Walaa Abu Baker Basha.

1Biological Anthropology Department, National Research Centre, Giza, Egypt.
2Faculty of Science, Al-Azhar University (Girls) -Cairo, Egypt.

Abstract: Ancient Egyptians have long been known for their medical skills. Ancient Egyptian papyri, medical texts and iconography indirectly suggested that ancient Egyptians used surgical techniques, such as trephination and amputation, as a means of therapeutic medical treatment. Our study presents two cases with amputation out of 204 skeletons. These skeletons were excavated from Giza necropolis and belonged to the Old Kingdom period (2700 - 2190 B.C.). The two cases were adult males from two different social classes. The first individual (case 1) was for a high official male with amputation in the right tibia and fibula, while the second individual (case 2) was for a male worker with amputation in the left ulna and radius. The distal ends of all amputated bones were well-healed; suggesting that they lived long enough after the amputation was done. Radiographs showed normal bone robusticity in the high official male and decreased cortical bone thickness in the male worker. Trauma or disease may be the reason for such amputations. The study confirms the hypothesis that ancient Egyptians used amputation as a therapeutic medical treatment. It is possible that the high official male individual, with the lower limb amputation, had used some sort of binding or prosthetic devices as an aid for walking. The pattern of healing in both individuals, from the two different social classes, suggests that medical care was equally introduced to them.

Key words: Amputation, Ancient Egyptians, Old Kingdom.

INTRODUCTION

Ancient Egyptians performed surgery on their wounded, but it was not quite the same as modern practices. Ancient surgical tools included knives, drills, saws, hooks, forceps pinchers, scales, spoons, and a vase with burning incense. The Edwin Smith Surgical Papyrus, dating from the seventeenth century B.C., is one of the oldest of all known medical papyri. It is thought to have been based on earlier documents, possibly by the 27th century B.C. medical writer and architect Imhotep. The Edwin Smith papyrus, although it contains magic, provides information on trauma surgery, as well as, balanced procedures. Moreover, surgical techniques were included in the Edwin Smith and Ebers papyri as treatment for disease or trauma[1]. Trauma was generally excluded from the area of magical etiology. The great varieties of injury sustained during wars, agricultural tasks, and works were viewed as natural effects of these activities and did not require magical explanation. The therapeutic amputation of severely fractured bones was not discussed in the medical papyri; which included splinting as a method to treat fractured bones.

Amputation and trephination are the two most common forms of ancient surgery described in the palaeopathological studies[2,3]. There is evidence of the use of prostheses from the times of the ancient Egyptians. Such prostheses were developed for function, cosmetic appearance and a psycho-spiritual sense of wholeness[4,5].

MATERIAL AND METHODS

In this study, an ancient Egyptian population from Giza was examined for amputation. It consisted of 204 skeletons (2287 long bones). This population sample represents a very important period in the history of ancient Egypt "the pyramid builders' period". The skeletons belonged to the Old Kingdom period which started by the third dynasty and ended by the end of the sixth dynasty "2700 - 2190 BC."[6]. They were excavated from the Giza necropolis and classified into two socioeconomic classes; high officials and workers, according to characters, design and contents, as well as, the writings and drawings on the walls of the tombs[7]. Ancient Egyptians believed in the after life, so they equipped their tombs with funerary furniture, which reflects the socioeconomic standard of the occupant[8,9,10]. Moreover, the design of the tombs and presence of statues and relieves all express the socioeconomic standard of the sectors of the population.
Determination of the sex of the skeletons was carried out using the descriptive methods of both skull and pelvis\(^\text{[11]}\). Estimation of the age at death was carried out using the auricular surface metamorphosis, according to Meindel & Lovejoy\(^\text{[12]}\) and from the pubic symphysis, according to Meindel \textit{et. al.}\(^\text{[13]}\).

RESULTS AND DISCUSSION

Case I: This skeleton was excavated from Giza Western Cemetery, which contained 114 skeletons (65 male and 49 female), and belonged to the high officials. The skeletal remains of this case represent an adult male of age range 40-50 years. This male skeleton showed well-healed amputated left tibia and fibula (Figure 1 A, B & C). All foot bones were absent. Both distal ends of the amputated left tibia and fibula show non-functional surfaces that are abnormally pointed and bent inward. Radiographs show normal bone robusticity of both tibia and fibula with normal cortical bone thickness (Figure 1B & 1C).

Case II: This case was excavated from Giza South East Cemetery, which contained 90 skeletons (47 male and 43 female), and belonged to the workers. The skeletal remains of this case represent an adult male of age range 40-45 years. This skeleton showed amputation in the right ulna and radius (approximately at the distal 1/3), with shortening 118 mm in the right ulna than the left one (Figure 2A). All hand bones were absent. Figure 2 shows the right amputated ulna and radius, humerus and the left fractured fibula of this individual. Both distal ends of the right amputated ulna and radius show non-functional joint surfaces, healed pointed ends and laterally curved medial sides. The right humerus shows distortion and curvature (Figure 2A). There is no evidence of bony reaction, either lytic lesions or proliferation. Radiographs show a decrease in cortical bone thickness in both amputated ulna and radius (Figure 2C, D). This individual had oblique fracture in the proximal end of the left fibula (Figure 2 A, B).

![Fig. 1](image1.png)  
**Fig. 1:** Case I, amputated tibia and fibula of the high official male (A), a radiograph of the amputated tibia (B), a radiograph of the amputated fibula (C).

![Fig. 2](image2.png)  
**Fig. 2:** Case II, amputated right radius and ulna, humerus and fractured left fibula of the worker male (A); a radiograph of the fractured left fibula (b); lateral radiograph of amputated bones (c); antero-posterior radiograph of amputated bones (D).
Discussion: Possible cases of amputation in the archaeological record were provided\[14,15\]. Written descriptions of amputation dated back to the 16th century BC, whereas the practice is well-described by Roman physicians of the first century AD\[16\]. Other cases of possible amputation were reported in skeletal remains from North, Central, and South America\[17,18,19,20,21,22\]. Pre-hispanic artistic depictions of individuals missing feet, hands, or entire limbs suggest that amputations were performed in the Americas before European contact\[23,24\].

Evidences of trephination\[25\] and amputation\[26,14,15\] were provided in some archaeological records. Amputation and trephination are the two most common forms of ancient surgery described in the palaeopathological literature\[2,3\]. However, if trephination and amputation are classified as surgical procedures, then there may be some physical evidence supporting the practice surgical treatment in dynastic Egypt. The two cases of amputation described in this study represent well-documented skeletal evidence that ancient Egyptians performed successful amputations in the upper and lower limbs. The healing patterns of the high official individual (case I) may suggest that binding or perhaps therapeutic prostheses were used by this individual as an aid for walking. It is obvious in figure 1 that this individual had well-healed distal ends of both tibia and fibula with non-functional surfaces and pointed ends, indicating the use of lower limb.

It worth mentioning that, prosthetics were thought to have been used only in the funerary process as a way of replacing missing body parts\[27\]. In ancient Egypt, some cases with apparent therapeutic/functional foot prostheses were discovered\[28,29,30\]. Disease processes that affect the bones of the feet, particularly diabetes and leprosy, should be considered. The earliest published cases of skeletal leprosy in Egypt were from the Dakhleh Oasis and dated back to the Ptolemaic and Roman periods\[31,32\]. On the other hand, recognized skeletal evidence supports the idea that leprosy was not present in Egypt before 600 B.C\[33,34\], thus carrying out a differential diagnosis of leprosy for this individual was very unlikely. Moreover, diabetes mellitus cannot be suggested for this individual, due to the absence of notable skeletal changes characterizing diabetes. It is clear in figure 1, that tibia and fibula show amputation, with approximately 2/3 of the remaining shaft, hence, it is apparent that this individual suffered from a traumatic incident.

Regarding case II, both distal ends of ulna and radius of the male worker showed well-healed pattern, indicating that this individual lived long after the amputation occurred. Also, the distortion and curvature in the humerus indicated the usage of this arm after amputation. This individual also suffered from an oblique fracture in the proximal end of the left fibula, which appears to be related to a crushing accident. Some studies reported that amputation of the forearm was potentially the result of punishment due to lack of another suitable explanation\[35\]. Osteoporosis can be suggested for this individual. Recognized skeletal evidence of osteoporosis in some cases in this sample has been reported previously\[36\]. Regardless for the cause of amputation, the evidence for amputation may indicate that an attempt to save this individual’s life. The four cases with amputation (humerus, ulna and feet), from the archaeological site of Dayr al-Barsha, Egypt, indicated past amputation with healing\[37\]. The specific healing patterns suggest that binding or perhaps therapeutic prostheses were used by these individuals to aid in walking. Hence, it was concluded that amputation may have been considered a valid medical technique used by the ancient Egyptians, to deal with certain medical conditions of particular diseases or trauma. However, it was reported that trauma is the clear cause of the injuries in ancient Egyptians\[37,38\]. Disease processes that affect the bones of the feet (notably diabetes and leprosy) lead to amputation. Also, victims of interpersonal violence, related to battle, have been reported.

Possible cases of amputation in the archaeological record, emphasizing some of the problems in diagnosis, were reported\[14,15,36\]. Also, amputation with missing limbs, hands, and feet are represented in art\[39\]. Three probable cases of foot amputation, with healing, in skeletal remains associated with the Moche culture (AD 100-750) of northern coastal Peru, were described\[40\]. The osteological evidences in these cases are consistent with details shown in artistic mode ceramic depictions of footless individuals. All Moche artistic representations of amputees that have been examined appear to be males, although identifying gender in Moche art is difficult in some cases\[41\].

In the present study, the presence of the two cases with amputation from two different social classes indicated that the medical care was equally introduced to both classes and amputation process may have been considered a suitable medical technique; used by the ancient Egyptians to save their lives. In the present study no skeletal changes specific to diabetes or leprosy were observed. Osteoporosis can be suggested in the male worker. Moreover, war can be excluded because there was no evidence of any war at this period of time. So the cause of amputation in our study may be due to accidental occupation basis or interpersonal violence.

REFERENCES


