A historical hypothesis of the first recorded neurosurgical operation: Isis, Osiris, Thoth, and the origin of the djed cross

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A new textual analysis of the central religious aspect of the ancient Egyptian creation myth reveals what appears to be a description of the oldest recorded neurosurgical operation, occurring circa 3000 BC. The analysis results in a hypothesis suggesting that traction reduction was used successfully to reverse a paralyzing cervical spine injury of an early Egyptian leader (Osiris), which inspired the story of his resurrection. The Egyptian mother god Isis, working with the god Thoth (the inventor of medicine), resurrects Osiris by treating his damaged cervical spine. Numerous references in the Papyrus of Ani (Book of the Dead) to Osiris regaining the strength and control of his legs are linked textually to the treatment of his spine. The connection between the intact spine and the ability to rise and stand is used as a distinct metaphor for life and death by the spinal representation of the “djed column” painted on the back of the numerous Egyptian sarcophagi for thousands of years. Controversy over the translation of the vertebral references in Egyptian texts is clarified by considering the specific neurosurgical meanings of hieroglyphs appearing in both the Edwin Smith medical papyrus and in the Papyrus of Ani, and in light of recent scholarly reassessments of those hieroglyphs in the Egyptological literature.

KEY WORDS • ancient Egypt • cervical spine • djed column • history of neurosurgery • traction

The creation of woman from Adam’s rib is difficult to analyze in any meaningful medical sense. The role of the spine in the Egyptian creation myth, however, may be a description of the first recorded neurosurgical operation. In one part of this story, the Egyptian god Isis resurrects Osiris by reassembling his spine. She is assisted in this task by Thoth, the god of wisdom and science and the inventor of medicine.

The Story of Isis and Osiris

The Egyptian myth resembles a Roman or Greek religious format, involving many different characters with godlike qualities who act out their emotions and engage in conflicts with each other. The Egyptian myth tracks historical progress beginning with formation of the earth from the formless void, eventually approaching political history by appearing to document the emergence of the pharaonic dynasties and the political union of the upper and lower kingdoms of the Nile that led to the formation of the first recorded neurosurgical operation.
of ancient Egypt. This formation occurred circa 3100 BC, about the same time that Egyptian hieroglyphics first appeared. The first pharaoh of the first dynasty was Hor-Ah (or Menes), who ruled over an Egypt recently united by his father, Narmer.

In the penultimate part of the Egyptian creation story, a set of six siblings is described. Among them are Isis, the mother god of Egypt, and Osiris, the eventual god of the underworld as well as both husband and brother to Isis. Seth, another of the siblings, becomes jealous of the relationship between Isis and Osiris. At a great feast, he tricks Osiris into lying down in a sarcophagus. Seth then seals the sarcophagus, effectively killing Osiris. He then sends the sarcophagus out to sea, where it washes ashore in Byblos (in modern day Lebanon or at a similarly named city in the Nile delta) and becomes part of a tree growing in the royal palace.

Isis, mourning her lost brother and husband, searches the world and locates the remains of Osiris. She disguises herself as a wet nurse to gain employment at the palace in Byblos to confirm her suspicions. Isis then reveals herself to the royal court and reclaims the body of Osiris and his sarcophagus to return them to Egypt. When she arrives there with the remains of Osiris, however, she is discov-
The Nature of the Translational Differences

The story of Isis and Osiris has been understood since the classical eras, and was described in some detail by the great Roman historian Plutarch. Plutarch’s version, however, omits the part of the story regarding the spine. Academic historians and Egyptologists in the classical world show her seated with the infant Horus on her lap. To evade Seth, Isis hides the baby Horus in a basket in the reeds of the Nile. Horus survives and grows up to battle Seth, whom he defeats to avenge his father’s death. Horus then becomes the first Pharaoh of a united Egypt. During the battle, Seth gouges out one of Horus’s eyes. Thoth restores the eye of Horus and it is this symbol of the restoration of the eye that is the antecedent of the modern “Rx” symbol for medical prescriptions.

The resurrection of Osiris is symbolized by the djed column. This symbol is a type of cross with a tall vertical bar and four parallel crossbars perpendicular to the tall bar. The djed column is understood as a depiction of the human spine and ribs of Osiris, and was painted on the back of many Egyptian sarcophagi to express the wish of the deceased to share the fate of Osiris in being resurrected to live for eternity in the underworld. There was an annual commemoration of the resurrection of Osiris that took place for thousands of years in the Middle East that involved the erection of the djed column (Fig. 1). This commemoration was typically celebrated on the date of the winter solstice (approximately December 25).

Medical Context of the Book of the Dead

At the time that Sir Wallis Budge was translating the Book of the Dead, the Edwin Smith papyrus had not been translated. The translation of this papyrus did not occur until 1926. The Edwin Smith papyrus is a medical text mostly concerned with early neurosurgery circa 1500 BCE. It deals formally and specifically with cervical and lumbar spine injuries, distinguishing which should cause total paralysis and which should affect just the legs. This papyrus therefore provides incontrovertible evidence that the hieroglyphics translated as spinal references by Budge in the Book of the Dead were indeed hieroglyphics that specifically referred to vertebrae.

The confusion between Budge and Faulkner on this point is exemplified by a symbol we identify as Gardiner No. S 24 (Fig. 2). This symbol can be translated as a “girdle knot,” but the writer of the Smith papyrus uses it as “cervical vertebra.” The appearance of the symbol suggests the appearance of a vertebra. Budge translates relevant sentences as referring to the spine, whereas Faulkner translates them as referring to clothing.

Almost any reading of the myth of Isis and Osiris makes the body part reference to the spine unmistakable. The body of Osiris has been chopped into pieces by his brother Seth. Isis must travel the length and breadth of Egypt to find all the pieces and then, with Thoth’s help, she reassembles them and accomplishes the resurrection of her brother and husband Osiris. This is clearly not an ancient story about collecting pieces of clothing. Osiris rises and becomes lord of the underworld. A representation of the spine of Osiris—the djed column—is copied onto the back of the sarcophagi of thousands of Egyptians hoping to accomplish the rebirth into the afterlife that Osiris achieved through his resurrection (Fig. 3).
Analysis of the Resurrection Myth

It is clear from the medical texts that Egyptian physicians were well aware of the relationship between spinal injury and paralysis.\textsuperscript{13} They clearly understood that wounds and sprains of the spine could be treated, and they recommended such treatment. Similar to practitioners in the modern era, however, they stated that paralysis from a spinal injury could not be corrected.

Our current guidelines for treating spinal injury accept the fact that urgent treatment of spinal injuries sometimes can resolve neurological deficits.\textsuperscript{11} There are many reports of situations like the following case report from Harborview Medical Center in Seattle:

A patient involved in a motor vehicle accident suffered a neck injury and experienced immediate C-6 level loss of all sensation and movement. The patient was airlifted to Harborview and placed in traction within an hour of injury. Plain radiographs obtained in the emergency room revealed jumped locked facets at C5–6. Using real time fluoroscopy, Gardener-Wells tongs and 50 pounds of traction, weights were progressively applied over 30 minutes and a closed manual reduction of the fracture displacement was accomplished. The patient experienced immediate resolution of the paralysis and was then transported to the operating room for anterior and posterior internal fixation (see also Grant et al.\textsuperscript{10} and Lu et al.\textsuperscript{17}).

Is it possible that in ancient Egyptian times a high-ranking military or political leader suffered a paralyzing cervical spine injury but recovered after the application of spinal traction? It should be clear that recovery from paralysis after urgent cervical spinal traction/reduction is still a dramatic and memorable occurrence. If such an event occurred early in the history of Egyptian civilization, could it have been memorialized in part in the story of Isis and Osiris? It is unquestionable from the Edwin Smith papyrus that Egyptians from the earliest recorded times were very actively involved in the treatment of spinal injuries due to warfare. The fact that the Egyptian medical text advises the physician of likely failure in treating spinal cord injury means that the writer must have been aware of failed attempts.

It is also clear that, at some level, there was a fascination with the analogy between the impact of a spinal injury/paralysis and the potentially reversible events surrounding death. Critically, a comparison was made between the concept of life and death and the impact of a spinal injury on the ability to stand upright. This comparison is the basis of asking whether or not the resurrection of Osiris by reassembling his spine is actually a distant historical description of an ancient warrior or king experiencing reversal of paralysis by treatment of a cervical spinal injury.

What are the types of treatment applied to spinal injuries described in the Smith papyrus? There is no specific description of spinal traction in the available texts; however, the general principle of applying spinal traction is clearly quite ancient. The oldest formal medical description of medical traction devices is from the work of Hippocrates circa 500 BC. In Vedic Hindu texts written between 1800 and 3500 BC, however, Lord Krishna employs manual cervical traction to straighten the spine.\textsuperscript{12} There is also evidence from other medical texts and relics that traction was used to treat some other types of fractures. Among the best pieces of evidence is the discovery of a number of mummies with well healed and nearly perfectly aligned major long bone fractures.\textsuperscript{22} The practice of binding fractured limbs with linen is also suggested by other funerary findings. The period of time we are investigating to support a medical basis for the Osiris resurrection is around the time of the union of the upper and lower kingdoms of Egypt, the same time in which the Vedic texts were written.

The Papyrus of Ani

The Papyrus of Ani refers to a variety of related texts that have been found in a number of versions. A wealthy person preparing for death would arrange for a copy of these funerary texts to be made by a scribe. The copy would then be placed among the funerary objects along with the mumified body after death. The text takes various forms but includes spells and instructions to help ensure that the deceased will please Osiris and be granted eternal life.

The Papyrus of Ani is a particularly elegant copy that is well preserved. It is illustrated by a series of traditional images as well. This text is among the best and most complete sets, and it is the version translated by both Budge and Faulkner that we refer to as the Book of the Dead. A number of passages translated by Budge make little specific sense unless we consider the possibility that the text tells the story of a recovery from a spinal injury. This possible interpretation is supported by the following sections of the Papyrus of Ani:

Plate XV, Chapter 26:

...make strong, Anubis, my legs to rise up for myself...I have gained power over my two hands and arms, I have gained power over my feet.
Plate XVI, Chapter 27:
...He has gained power over his own limbs.
Plate XVI, Chapter 42:
...coming forth by day, and of gaining power over the legs...
my steps are made long, my thighs are lifted up, I have passed along the great path and my limbs are strong.
The critical recitation of the essential spinal referents occurs in Plate XVI, Chapter 40:
Bindeth up for me the vertebrae of my neck and back... It hath been granted on the day of establishing my rising up from weakness upon my two legs, on the day of cutting off the hair. Seth and the cycle of gods in their strength pristine hath bound up the vertebrae of my neck and back, may nothing happen to cause their separation... Nut [mother of all gods, goddess of the sky] hath bound up my vertebrae.
The importance of this last passage relative to the others is the specific linkage of binding up cervical and thoracic/lumbar vertebrae to the phrase concerning rising up upon two legs that occurs in numerous other places throughout the texts. Finally, there are various known versions of Chapter 155 that link the spine to the djed column, reading either “Thou risest up for thyself...” or “Thou hast thy backbone...Thou hast thy vertebra...” followed by an instruction to place a djed of gold on the deceased. This linkage, the composition of the djed hieroglyph from a spinal hieroglyph, and the usage of the djed hieroglyph to communicate the word “spine,” are explored in further depth by Gordon and Schwabe.9

Long-Term Impact of the Symbols of the Resurrection of Osiris

Among the fascinating aspects of the myth of Isis and Osiris are the numerous links to stories and symbols in the Judeo-Christian traditions. The dominant religious practice of the principal civilization in the Middle East centered on Isis from 3500 BC through AD 500, when it was finally and ultimately suppressed. These parallels between the two traditions include the birth of Horus by immaculate conception; the resurrection of Osiris, who then determines eternal life or eternal damnation; and the newborn Horus being hidden in a basket in the reeds of the Nile by his mother and growing up to establish and lead a historical civilization. To neurosurgeons, the most intriguing symbol shared between the two religious traditions is the djed cross. Images of Osiris drawn over the cross, as well as of the erection of the cross to celebrate the resurrection, are certainly remarkable (Fig. 1). The possibility that these images memorialize the first recorded reduction of a spinal injury to reverse a paralysis is striking. If true, it places the first known neurosurgical operation as the foundation point for the principal religious symbols in continuous use for the past 5000 years.

Conclusions

Religious myths do not need to have any basis in historical fact. Yet there is widespread acceptance of the fact that in societies with written traditions that are as ancient as their core mythologies, historical reporting may be included in these accounts. This understanding is why we assume, for example, that the Old Testament story of the Israelites forced to provide slave labor in Egypt at the time of the Pharaoh Ramses reflects actual historical events. In the humanities literature, there has never been any suggestion as to the potential factual basis of the Osiris “spinal” resurrection story. From a neurosurgical point of view, however, this story involves a nexus of three fasci-
nating elements. In the first element, medical neurosurgical teaching is known that is widely thought to originate long before the Smith papyrus was transcribed. This description suggests attempts to treat paralysis from spine fracture in a medical tradition in which spinal traction for fractures was understood. The date of this teaching is commonly proposed as being well before 2500 BCE. The second element is evidence of an association in common Egyptian religion between an intact spine and the ability to rise from the dead. Finally, the third element is the odd story of a goddess/queen assisted by a god of knowledge and medicine reassembling the spine of a fallen king to achieve his resurrection. Therefore, it is the conclusion of this author that there is a very real possibility that the oldest written tradition in the world tells the story of the first recorded neurosurgical operation.

References