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REVIEW ARTICLE

## Surgery: Pearls in Ancient Mesopotamia

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### ABSTRACT

Many surgical disciplines date their origin to ancient Mesopotamia. The existing documents from the Assyro-Mesopotamian era which have reference to medicine and surgery are rare and precious. The medical treasures remain underexplored. In this article, our purpose is to shed light on what has been written in the literature on Mesopotamians' surgical practice.

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### INTRODUCTION

The art of surgery has its roots in the ancient civilizations. Although surgical feats in the modern world have become highly developed, it is impractical to disjoin the current advances in the art of surgery from socio-cultural and medical principles of early lives.

All kinds of professions acknowledge their ancient connections, and many medical innovations have, to some extent, their basis in ancient civilizations such as ancient Mesopotamia.

Mesopotamian's cultures have considerably enriched the world with its highly valuable heritage in different disciplines including the art of surgery.

The art of anesthesia has a ubiquitous existence in the heritage of Mesopotamian's medical knowledge, yet chest and abdominal surgery had been mentioned in the

records <sup>1, 2, 3</sup>. In this article, we will highlight on these roots in the science of surgery to show what had been practiced in Mesopotamia. Also, we will elucidate the historical and the medical practice pillars in the Mesopotamian era.

#### Historical pearls <sup>4, 5</sup>

The 4th millennium BC was the beginning of the appearance of a well-developed civilization in the globe called Sumeria in the region of what currently is known as Iraq. The Tigris and the Euphrates Rivers play an indispensable role in the emanation of this civilisation with its highly organized cities built in this region, such as Kish, Lagash, Nippur, and Uruk. The discovery that the first writing was developed in this region which

subsequently evolved into a script that eventually was impressed onto clay tablets. The cuneiform writing as it became known attributed to the shape of writings on the clays. It consists of lines and wedges, and it includes about six hundred signs.

Sargon of the city of Akkad (around 2350 BC) was a famous king in a Sumerian-Akkadian nation (2400 - 2000 BC). The city was formed in Sumeria and Sumerian was the language. Later, a Babylonian nation was established and lasted ten decades. Hammurabi (1792 - 1750 BC) was a well-known king who set his capital at Babylon. Assyrians subsequently conquered Babylon, from the northern neighboring nation, Assyria. The capital located at Nineveh around 1100 BC. Ashurbanipal (669 - 629 BC) was the last known king who has specific roles in collecting cuneiform literature of Mesopotamia that had been written on clay tablets. The Medes and Chaldeans, in 612 BC, ended the era of Nineveh and had re-developed the Babylonian empire over a short period (612- 539 BC), before being conquered by the Persian Empire.

## Medical pearls Sources

1. Hammurabi's Code <sup>6,7</sup> (Figure 1)(18th century BC). It is a stele of black diorite, 2.4 meters high, with laws relating to medical and surgical practice:
  - a. Medical fees were applied for the first time in history. Codex fees were relied on specific categories in the social class for patients and their abilities to afford the treatment fees and how much the operation is serious. Successful and unsuccessful fees including the penalties were imposed in the law setting.
  - b. Punishments were applied for the failure of doctors and for malpractice, for example, a healer causing death or blindness to a high-born person had his hands cut off.
  - c. Healers should not work all the days of a month.
  - d. Unethical to manage hopeless cases.
  - e. These rules were to be followed rigidly; otherwise, a terrible curse invoked.
2. Assyrian laws <sup>6</sup> (early 1st millennium BC) also ruled medical conduct:
  - a. Retributions and compensations for malpractice.
  - b. A self-induced abortion was considered medical-illegal and has a punishment.
3. Sigerist <sup>6</sup>: represented Hittite medical codes, which included high ranked humanity in the ancient Middle East.
4. The Diagnostic Texts <sup>7</sup>/Handbook <sup>8</sup> (also known as the Book of Prognoses <sup>6</sup>): It is forty pieces in total, and its origin probably belongs to the Kassite period (late second millennium BC). It is made of five parts:
  - a. Two tablets: observed essential omens relating to the patients.

- b. Twelve tablets: apparent symptoms of particular body organs.
- c. Ten tablets: described prognosis in regard to disease progression.
- d. Ten tablets: related to complicated illness and treatment.
- e. Six tablets: diseases of women, including pregnancy, and children.
5. The earliest prescription texts <sup>7</sup> are from the end of the 3rd millennium BC and rationally encompass treatments, free of spells and incantations. These texts were written in Akkadian and Sumerian. Other texts are from Assyrians, but apparently of Babylonian origin, and focus on orally administered materials and heated baths.
6. Other medical data: Hussel <sup>8</sup> depicts a tablet which is around 400 BC with an entirely different approach, in which a column of diseases was related to four listed organs of origin; the heart, stomach, lungs, and kidneys.
7. Referenced letters <sup>6</sup>: they stand for scattered royal letters, which have medical information, between the kings and their staff.

## Practice

In Mesopotamia, there was a management care system that controls the work of health care provider in terms of quality and leadership, and the fees of health care based on the type of treatment and the outcome of health services <sup>1</sup>.

In addition, there were titles and categories for doctors. In addition there were specific facilities for patients and doctors, for instance, equipped offices, beds and schools <sup>1</sup>.

Two types of medical practice developed in Mesopotamia; the first one is called 'therapeutic medicine' which practiced by the Aso or Azu and the second kind was known as 'divinatory medicine' and practiced by the Asipu or Ashipu. Asu or Azu was focused on surgery, while Asipu or Ashipu was interested in divinatory and religious medicine <sup>1</sup>. According to the Code of Hammurabi (c. 1700 BCE), spiritual healers were either diviners, baru, who were interested in hepatoscopy (liver) and prognoses or exorcists, ashipu, who focused on religious reasons for the diseases <sup>1,9</sup>. In addition, the Asu or Azu doctors underwent their medical training in schools using clay tablets books <sup>1</sup>. Both doctors worked collaboratively rather than competitively according to the ostensible records that described the same king, consulting both kinds of healers <sup>9</sup>. Interesting and noteworthy is that doctors in Mesopotamia wore a particular medical suit and a particular haircut <sup>4</sup>.

Many gods were incorporated in the craft of both kinds of healers <sup>6,7</sup>:

- a. Ninib (Enlil's son) and his consort Gula, the famous woman doctor who performed resuscitation for the

dead using her hands. The temples of Gula were places of treatment for sick people.

- b. Ninazu (Lord of Physicians) and his son Ningishzida were founders of the modern emblem of the medical sciences, double-headed snake.
- c. Ea (Lord of Water) believed to be the ancestor of physicians.

The decision after making the diagnosis was <sup>1</sup>:

1. Prescription of drugs. Over 250 plants, 120 minerals and 180 other materials were used with alcoholic products, fats, honey, oils or milk. Drugs used for external purposes were made in combination with solvents from plants or other products.
2. Perform surgery.
3. Set fractures.
4. Treat superficial skin problems including snakebites.



Figure 1: The code of King Hammurabi. Louvre Museum, Paris.

### Surgical pearls

In regards to the records, there was no evidence that the science of surgery specialized in any surgical branch at the time of Mesopotamia <sup>10</sup>.

In fact, Mesopotamians had a remarkable understanding of pharmacy, dominantly depending on plants <sup>10</sup>. A fifteen detailed prescriptions in the science of the pharmacy had been outlined in cuneiform tablets from Sumeria (3000 BC) <sup>3</sup>.

Narcotics were also discovered at that time from *Cannabis sativa* (hemp), *Mandragora spp.*

(mandrake), *Lolium temulentum* (darnel), and *Papaver somniferum* (opium) <sup>1</sup>. Moreover, opium poppies were present in Sumeria by 3000 BC <sup>2</sup>.

The surgeon's knife (naglabu) initially depicted in pictures of a barber with a razor <sup>9</sup>. Scissors and knives were sharpened using a grindstone <sup>10</sup>. Large and small knives from different metals had been used for various procedures, for example, a small knife was used for eye operations <sup>10</sup>. The Ninevite surgeon used a leaf-shaped blade with a coarse-toothed saw, while a blunt instrument was used in obstetrics <sup>10</sup>.

Another crucial surgical instrument used was a spoon or spatula which was made of wood or metal and had various sizes for different purposes <sup>10</sup>. A small hollow apparatus made of different metals had been used by doctors. Examples of use included insertion into the urethra, and the external auditory meatus or for the installation of eye drops <sup>10</sup>.

Eight of the fifteen Mesopotamian's prescriptions were devoted to how to apply plasters for the treatment of wounds and sores <sup>9</sup>. Other records outlined specific postoperative instructions, for instance, the dressing of operation sites with oil soaked linen bandages <sup>9</sup>. In addition, there are descriptions of the stitching of wounds using different materials including fine threads performed in ancient Mesopotamia. Descriptions exist of the use of a manufactured net made of of fine and thin mesh <sup>10</sup>.

Operations done by doctors for superficial lesions and snakebites <sup>1</sup>. Castration was performed evidenced by mention of the existence of eunuchs in court texts <sup>1</sup>. Interestingly, Babylonians possibly underwent venesection in the late first millennium BC <sup>11</sup>. Plastic operations were done by barbers to remove slaves' branding marks. A veterinary surgeon was also available to perform operations on animals <sup>1</sup>. A wet-nurse could be considered to be a dietitian or nutritionist. Hammurabi's Code contains the health care duties that each health provider should perform as for each medical intervention <sup>1</sup>.

Drainage of liver and the pleural abscess is described in Mesopotamian texts as requiring a cut between the third and fourth ribs <sup>9</sup>. A text of "Prescriptions for Diseases of the Head" contained a neurosurgical procedure which involved draining the abscess and scraping infected skull bone if necessary <sup>9</sup>. War surgeons were deployed in military campaigns that involved the Assyrian and Babylonian armies and according to Hammurabi's code, knives were used by the doctors to perform operations to the injured <sup>10</sup>.

Rectally administered therapies, suppositories and enemas comprising herbal materials had been used for various indications such as analgesia. This occurred in Mesopotamia according to the Assyrian Herbal and prescription texts <sup>4</sup>. The opium poppy grew in Mesopotamia, and its extracts had been used as anal suppositories for obtaining relief from painful conditions <sup>10</sup>. Other ingredients, coded in the tablets were used as laxatives and antiseptics <sup>11</sup>.

It has been deemed by some that the abdominal wall closure was successfully performed in Mesopotamia <sup>9</sup>. Many descriptions of various ailments were recovered from the clay tablets and include many abdominal problems such as constipation, colic, appetite control and rectal prolapse. Fevers, abscesses and gallbladder problems were also recorded in these texts <sup>12</sup>.

### DISCUSSION

The art of surgery has developed considerably since the dawn of ancient civilizations. Irrefutable evidence of surgery has been discovered to have occurred in

Mesopotamia, and many surgical lessons have been revealed.

Unfortunately, many Mesopotamian texts in medicine have become like excerpts from a sorcerer's notebook for various reasons. These include the poor translation abilities of non-specialized people<sup>13</sup>. Some modern research is capable of illustrating more accurately what the Mesopotamian texts are describing. These are ostensibly rational in regard to medical prescriptions for a wide range of diseases such as those caused by worms, flukes, and skin lesions<sup>14, 15, 16, 17, 18</sup>. Moreover, certain kinds of the treatments probably have a scientific basis<sup>13</sup>.

To recommend conservative management was the popular decision for Mesopotamian doctors; however, significant surgical operations were performed. Regrettably, the outcome of these procedures has not been determined<sup>10</sup>.

Having identified these medical pearls, particularly as relating to the art of surgery, in Mesopotamia, appropriate awareness regarding a more clear evaluation and search is of paramount value to approach facts in this civilization.

The notion of appropriate medical conduct was rigidly implemented in the ancient Mesopotamia. There were well-defined rules which possibly required experimentation in medical practice to be under the supervision of law<sup>19</sup>. Health care systems covered all residential people including those in the conquered lands. Additionally, medical records were systematically organized. This is according to what has been recovered from thousands of clay texts detailing medical data for patients and doctors. The records included the names, diagnoses, treatment and prognosis<sup>20</sup>.

So, the art of surgery, to some extent, has derived many medical pearls and surgical knowledge from our ancestors in the era of Mesopotamia.

## CONCLUSIONS

Knowledge of ancient Mesopotamia in regard to medical practice, particularly in the craft of surgery can reveal many hidden secrets and explain the pathways of development of surgical practice.

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