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Review Article

UNANI SURGICAL WISDOM IN KHIYATAT (SUTURING) AND WOUND CARE: BRIDGING HISTORICAL PRINCIPLES WITH MODERN PRACTICE

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ABSTRACT

Healing of wounds was a matter of concern for all including ancient Chinese, Korean, Egyptian and African physician. Throughout history, a wide range of methods—both basic and advanced have been used to promote healing in acute wounds and to address the challenges of chronic wounds. As medicine transitioned from spiritual traditions to scientific understanding, the evaluation of treatment outcomes became increasingly important. This review examines these developments through the lens of Unani surgical wisdom in suturing, highlighting how earlier concepts continue to influence and support modern surgical practice.

KEYWORDS: Jarahat **(**wound**),** Khiyatat (suturing), Tafarruq-e-ittesal (discontinuity).

INTRODUCTION

The entire body's surface is covered by *skin,* which acts as a principle barrier between the environment and interior organ.[1] A break in the integrity of the skin or tissues often, which may be associated with disruption of the structure and function is known as *wound*. Classification based on thickness of the wound - *Superficial wound* involving only the epidermis and dermal papillae. *Deep wounds* are those extending deeper, across deep fascia into muscles or deeper structures. *Partially thickness wounds,* with skin loss up to deep dermis, with only other deepest part of the dermis where hair follicle shafts and sweat glands are left behind. *Full thickness wounds* including loss of entire skin and subcutaneous tissue causing spacing out of the skin edges. As per the duration of healing, they have been classified as *acute wounds* which are generally defined as those that progress through the normal phases of healing and typically show signs of healing in less than 4 weeks. *Chronic wounds,* if healing does not occur within the expected period according to its aetiology and localization.[2] Depending upon the exposure to external environment wounds have been classified as the following: *open wounds*: when the skin layer is broken, exposing the underlying tissue known as open wounds, which included incised, lacerated, penetrating and crushed wounds. *Closed wounds*, when there is no visible break in the skin but there is injury to the underlying tissue such as contusion, abrasion and hematoma.[3,4]

Wound healing process involves the interconnected movements of numerous cell types with different functions during the stages of hemostasis, inflammation, proliferation, re-epithelization and remodeling.[1,5,6]

Suturing is the closure of surgical as well as the traumatic wound and also final step of every surgical procedures.[7] Wound closure or Wound Suturing is done by 4 methods

1. Primary suturing (within 6 hrs) 2. Wound excision and primary suturing of skin 3. Wound excision and delayed primary suturing 4. Suturing (1-2 weeks later).[4]

In Unani system of medicine, *Jarahat (wound)* is described as the *Tafarruq-e-ittesal of leham* (wear and tear of muscle) free from pus. It is a severe *tafarruq-e-ittesal* in any part of the body especially in those structures which are soft and delicate such as fascia. In this condition skin and mucous membrane also involved.[8,9,10] There are numerous reasons like waram (inflammation), Fasad-i-Mizaj (altered temperament), Qillat-e-Dam (anemia), Dam-e-Ghair Ṭabai, Ufunat (sepsis), used improper medications and the presence of bone fragments in the wound that delay to heal wounds.[11] In Unani medicine, wounds are classified based on clinical characteristics, including the presence or absence of sepsis, the type of inflammation, the occurrence of maggots, the presence of burns, and the overall severity.[12]

Wounds (*Jarahat)* are of two types

1. **Simple (Basīṭ):-** *Basīṭ* is meant a wound in which there is no loss of the essential substance (*jawhar*) of the organ.
2. **Compound (Murakkab):-** *Murakkab* is meant a wound in which the essential substance of the organ is lost.

Simple wounds (*Basīṭ*) are further divided into two forms

1. **Shigaf:-** Those in which only a fissure or split (*shaqq / shigaf*) occurs.
2. **Tajwīf:-** Those in which a cavity (*tajwīf*) is formed.[13]

Overview of Unani Surgical Thoughts

The history of wound healing is as old as the history of mankind. The earliest medical writings deal extensively with wound care are found in the Smith Papyrus. Seven of the 48 case reports included in the Edwin Smith Papyrus (1700 BC) describe wounds and their management. Empirically, the ancient physicians of Egypt, Greece, India and Europe developed gentle methods of treating wounds by removing foreign bodies, suturing wounds, covering wounds with clean materials and protecting injured tissue from corrosive agents. The Unani concept of dry healing came from Buqrat (Hippocrates), at a time when the only function of dressings was thought to be the protection of the wound from injury.[15]

In the Unani system of medicine, surgery (Ilaj-bil-Yad) has always constituted an essential component of therapeutic practice since very ancient times. Unani physicians were pioneers in the development of surgical science and made significant contributions by designing surgical instruments and developing operative techniques. They not only practiced surgery but also documented their knowledge in several remarkable classical medical texts. Some of the most notable works include ***Al-Tasrif (Jarahiyat-e-Zahrawiya) by Abul Qasim Al-Zahrawi, Al-Qanun fi'l-Tibb by Ibn Sina, Kitab-al-Umda fi'l-Tibb by Ibn al-Quff al Masihi, Kamil-us-Sana by Ali ibn Abbas al-Majusi, and Kitab-ul-Mukhtarat fi'l-Tibb by Ibn Hubal al-Baghdadi.*** Another important contributor to early surgical practices was Galen, who was among the first to use ligatures in experimental studies on animals. Because of his contributions to the development and application of ligatures, he has sometimes been referred to as "The King of the Catgut Suture.*[16]*

The first surgical techniques were developed to treat injuries and traumas. A combination of archaeological and anthropological studies offer insight into much earlier techniques for suturing lacerations, amputating unsalvageable limbs, draining and cauterizing open wounds. Many examples exist: some Asian tribes used a mix of saltpeter and sulfur that was placed onto wounds and lit on fire to cauterize wound. Furthermore, the discovery of needles from the Stone age strongly suggest that they were used in the suturing of cuts and laceration. Evidences also suggest that certain tribes in India and South America developed an ingenious method of sealing minor injuries by applying termites or scarabs who bit the edges of the wound and then twisted the insects' neck, leaving their heads rigidly attached like staples.[16,17]

Classical Unani Texts Describing Suturing (khiyatat)

As recorded in **Kitāb al-Mukhtaṣar fī Heelah al-Barr** by **Ibn-e-Rushd**, when an abdominal rupture occurs and the **sifāq** (fascia) is also affected, the **sifāq** should be approximated with the **mirāq** (peritoneal lining) and sutured together.[11]

In ***Kitab al-Umda fil Jarāḥat*** by ***Ibn al-Quff al-Masihi*** and in ***Kitab al-Mukhtarat fi al-Ṭibb*** by ***Ibn Hubal al-Baghdadi*** state that If one margin of the wound is depressed or folded inward, it should initially be supported and approximated before the dressing is applied. If the two wound margins cannot be aligned adequately, then suturing with thread should be performed.[13,14]

In **Jaraḥiyat-e-Zahrawi**, ***Abul Quasim al-Zahrawi*** states that If a wound is large or caused by a sharp weapon and the edges do not approximate naturally, suturing (khiyaṭat) should be performed to close the wound and promote proper healing. In throat wounds, if the cervical vertebrae or larynx are cut but major blood vessels remain intact, the skin edges over the laryngeal area should be carefully brought together and sutured firmly, while the rest should be left undisturbed. Similarly, wide or gaping wounds on the chest or abdomen caused by a sword or knife should be sutured to aid healing.[18]

In **Al-Qanoon fit-Tibb**, *Sheikh al-Rais Ibn Sina* writes that if the wound is extensive and its edges cannot approximate either because it is circular in shape, or the margins have retracted widely due to tension, or the configuration of the wound has become irregular, or some portion of the tissues (jawhar-e-laḥm) at that site has diminished then such a wound should be managed by suturing.[19]

Suturing techniques in Unani Literature

In *Kitab al-Umda fil Jarāḥat*:- When a shiryān (artery) is severed, immediate firm pressure should be

applied to control bleeding, and if necessary, cauterization with a heated gold instrument is recommended for definitive haemostasis. In accordance with the Unani principles of Ḥābis-i-Dam described in Qawanin-e-Kulliyah, a similar approach is recommended for the management of severed warīd (vein). If a wound is 2-3 days old without suppuration, its margins should be gently freshened with a nishtar (surgical blade) to induce slight bleeding and stimulate healing, after which the wound edges should be approximated and dressed. Large wounds require suturing (khiyaṭat), followed by application of astringent (mujaffif) powders. Subsequently, Granulation promoting agents (mulhim advia) with moderate desiccant properties are applied to strengthen the wound edges, reduce moisture, and promote proper healing. The arteries (sharāyīn) and veins (warīdāt) should be securely ligated, and for this purpose, silk thread (abresham) is recommended to ensure effective ligation.

Use strong, good-quality sutures and close the wound systematically, tying a knot after each stitch to ensure proper approximation. Afterward, apply triangular shaped dressing with moderate tension and keep it in place until it adheres comfortably.[13]

Suturing Techniques in *Jarahiyat-e-zahrawi*

In ***Jarahiyat-e-Zahrawi, Abul Qasim al- Zahrawi*** describes four methods of abdominal wall suturing. The most common technique is the paired suture method, in which sutures are placed alternately in pairs along the wound margins to ensure proper closure. Another method is the four-margin technique, in which the skin (jild) and fascia (sifaq) are approximated together by passing a single moderately thick suture through the four corresponding margins, creating a uniform lattice-like pattern with adequate spacing to maintain proper tension. Jalinoos also described an alternating method that begins from the skin surface inward, in which the needle is passed in a sequence that alternately approximates the fascial edges until the wound is fully closed. Additionally, a layer-to-layer approximation method is described, in which each anatomical layer such as fascia is sutured with its corresponding layer in a systematic inward and outward manner; This approach is simpler, widely practiced, and considered superior to earlier technique of Jalinoos.[18]

Suturing Techniques in *Al-Qānoon fī al-Ṭibb*

According to Buqrat (Hippocrates), in cases of abdominal wounds where the mirāq (peritoneum) is torn and the intestines (am'ā) protrude, the first step is to assess whether the intestinal loops can be safely approximated and gently returned to the abdominal cavity. If the **s**arb (omentum) has also emerged, careful evaluation is required to determine whether pressure bandaging or suturing is appropriate to restore anatomical continuity and promote healing.

In large abdominal wounds where the intestines protrudes, the wound edges should first be brought closer together using a wide cloth or leather strip. Then, the wound is slowly opened as needed to gently returns intestines to the abdominal cavity. After that, stitches are appliedcarefully, ensuring that they are neither too tight nor too loose. Finally, proper bandaging is very important to keep the wound clean, stable, protected and to help it heal properly.[19]

Intra-operative Precautions During Wound Suturing:- Ibn al-Quff al-Masihi in his book *Kitab ul umda fil Jarahat* states that four essential conditions must be carefully observed during suturing.

1. The suture thread should possess moderate strength, as an excessively rigid thread may cut through the skin, whereas an overly soft or weak thread is prone to breaking.

2. The sutures should be placed at a moderate depth and at an appropriate distance from one another. If the sutures are placed too far apart, the wound edges fail to approximate adequately and healing becomes difficult. Conversely, if the sutures are placed too close together, they may cause excessive pain and discomfort.

3. While inserting the needle, care must be taken to puncture the skin at a moderate distance from the wound margins. If the needle is placed too close to the wound edge, the suture may tear through the tissue and fail to hold. Conversely, if the needle is inserted too far from the margins, it hinders proper approximation of the wound edges and delays healing.

4. The tip of the surgical needle should be designed such that its body is approximately three times the thickness of the point. This proportion allows the needle to pass smoothly through the skin, ensuring easy penetration with minimal resistance.[13]

Different suturing materials in different Era

Mesopotamian Civilisation (4000 B.C):- There are descriptions of the wounds stitching using different materials including fine threads in ancient Mesopotamia.[20]

Egyptian civilisation (3100 B.C):- The **Edwin Smith Surgical Papyrus** is the oldest known surgical text, describing wound suturing and infection prevention. The earliest preserved sutures, found on a 21st Dynasty mummy (around 1100 BC), were made from materials such as horsehair, tendons, and gold or silver wires.[20]

Chinese Medicine (2900 B.C): The most famous Chinese surgeon Hua T'o was credited with the invention of suturing.[21]

Indian Medicine (2500 B.C):- Sushruta described the use of various needles and threads for wound closure and recommended large black ants as natural wound clips for intestinal tears. The ants were applied to the wound edges

so that they gripped them firmly with their jaws. He also used cotton, drawn copper wire and horsehair as ligature materials.[21]

Ancient Greek Surgery:- Suturing was primarily applied to superficial soft-tissue wounds. The commonly used suture materials included strong fibers derived from animal tendons, strips of sifāq (fascia) and fine gold wires for osseous repair.[22]

- ***Buqrat /Hippocrates*** *(460-377 BC)* described the use of ivory and bone needles for wound suturing. The term *suture* derives from the Latin word *sutura* and was first used by him around 400 BC. He also used linen threads as suture material, particularly in fistula surgery.[23,25]

- ***Jalinoos /Galen*** (129–c.150 AD) of Pergamum, a physician to Roman gladiators, used sutures for repair of injured tendons and recommended silk and hemp for hemostasis. He also referred to the use of linen or Celtic threads, used wool in eyelid surgery, and provided one of the earliest reference to catgut, noting its low tendency for putrefaction and its spontaneous detachment from tissues.[23,25-27

- ***Zakariya Razi /Rhazes*** (850-923AD) used catgut (lute strings) to repair the abdominal wall and also used horsehair for suturing.[25]

- ***Ali Ibn Sina, or Abu ali Hasan Ibn Abdullah ibn sina /Avicenna*** (980AD–1037AD) observed that sutures dissolved quickly in infected wounds. To overcome this problem, he introduced pig's bristles as a natural monofilament suture and also described the techniques of double suturing, a technique that is still used in modern surgical practices.[24,27]

- ***Ismail Jorjani*** (1042, A.D.) described the use of a thin semi-circular knife for cutting and a curved metal needle with silk thread or horsehair for wound suturing.[28]

- ***Abul Qasim Zahrawi /Albucasis*** (936AD -1036AD) described sutures made from animal intestine. These gut sutures were originally used as strings for musical instruments, known as *kitgut*, later called *catgut*. Fine gut sutures were threaded through a needle with the help of a linen thread and used to stitch intestinal wounds.[23,26,27,29]

Modern Surgery:- ***Ambroise Paré*** (1509–1590), the Father of Modern Surgery, designed the *Bec de Corbin* (crow's beak) clamp to grasp bleeding vessels. Joseph Lister (1827–1912) introduced the concept of antiseptic surgery. He used carbolic acid to sterilise wounds, surgical instruments and sutures, allowing sutures to be safely left inside the body. His method greatly reduced post-operative mortality. Lister later improved catgut sutures and developed chromic catgut in 1881.[30,31,32]

Aseptic principles and surgical ethics in unani traditional suturing

Jalinoos states that a wound requires such bandaging only when the intention is to achieve ilsāq (approximation) and iltiḥām (primary healing), so that the wound edges unite properly. However, when the intention is to promote the generation of new tissue (laḥm-e-jadīd) within the wound, prolonged bandaging is not necessary.[19]

Hippocrates, a Greek physician, used **vinegar** to irrigate open wounds and wrapped dressings around them to prevent further injury. He cleaned the wounds with wine and dressed them with fig leaves.[22,30,31]

Mouldy bread was used as an antimicrobial dressing and a number of herbs and minerals were utilised when inflammation and infection were present. Mesopotamians washed wounds with milk or water before dressing them with honey or resin. Galen's experimentation and observation facilitated significant developments in surgical suturing and his approach to wound healing still relied on materials such as gauze for bandaging.[31]

Comparison with Modern Practice

Ibn al-Quff al-Masihi emphasizes careful approximation of wound edges and advises suturing when natural alignment is not possible. This clearly indicates that the concept of suturing has been practiced since ancient times, and that Unani aṭibbā' not only used sutures routinely but also described their proper indications and techniques. These principles closely correspond with modern surgical practices of wound closure and delayed suturing for infection control.[13]

Abul Qasim al-Zahrawi described the use of sutures made from animal intestine (kitgut/catgut) for wound and intestinal repair, a core concept of Unani surgery. The same principle is followed in modern surgery, where absorbable sutures like catgut are used for ligation and wound closure, while non-absorbable materials such as nylon or steel are removed after wound healing. Thus, many modern suturing materials and techniques are directly derived from Unani surgical concepts.[18]

Hemostasis, the arrest of bleeding, is achieved in modern surgery by using a hemostat—a ratcheted clamp that grasps blood vessels or tissues—followed by ligation of the vessel with sutures. Similarly, Unani surgeons also emphasized control of bleeding. As described in *Kitab al-'Umda fil Jarāḥat*, when a shiryān (artery) or warīd (vein) is severed, immediate and firm pressure should be applied to stop bleeding. If necessary, cauterization using a heated gold instrument was advised to achieve definitive hemostasis.[18]

Ancient physicians such as *Hippocrates* used vinegar and wine to irrigate open wounds and applied protective dressings to prevent infection, while other early civilizations relied on honey, resins, mouldy bread, herbs, and minerals

for their antimicrobial and anti-inflammatory effects. Similarly, Unani texts recommended substances like vinegar (sirka) as antiseptic and cleansing agents in wound care. These practices show an early understanding of antisepsis, which was later scientifically established in the 19th century by *Joseph Lister*, who introduced carbolic acid to prevent surgical infections. Thus, proper antiseptic measures after suturing are essential without them, the wound may become infected and healing may not occur effectively.[31]

CONCLUSION

The classical Unani literature demonstrates that fundamental principles of modern surgery—including suturing, hemostasis, incision and drainage, debridement, and antisepsis—were well established long before their formal recognition in modern medicine. Texts such as *Kitab al-'Umda fil Jarāḥat*, *Zakhīra Khwārazmshāhī*, and *Jarahiyat-e-Zahrawi* not only describe these procedures but also define their indications and techniques with remarkable precision. Modern surgical practices and materials, including absorbable sutures, vessel ligation, wound debridement, and antiseptic wound care, are therefore refinements and technological advancements of concepts originally articulated in Unani surgery. This continuity underscores the foundational role of Unani medicine in the evolution of contemporary surgical science.

The use of suture materials dates back to ancient civilizations, with early evidence from Mesopotamia, Egypt, India, Greece as well as Unani medicine. Materials such as linen, cotton, horsehair, pig bristles, and animal intestine (*catgut*) were used for wound closure and ligation, while al-Zahrawi introduced innovative techniques like ant-jaw suturing. Lister later refined these practices through antiseptic techniques. Modern synthetic sutures, staplers, and tissue adhesives represent technological advancements developed to overcome material limitations, however their underlying principles are derived from ancient and Unani surgical foundations.

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