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Review Article

Abul Qasim al-Zahrawi and his surgical work: a comprehensive review with unani instruments and clinical evidence

Mohd Danish Mohd Nasim Ansari[1]*, Huma Khatoon[2], Saiyad Shah Alam[3]

[1]Department of Ilm al-Jarahat, Ahmed Garib Unani Medical College (AGUMC), Maharashtra, India
[2]Department of Ilm al-Qabalat wa Amraz-e-Niswan, Ahmed Garib Unani Medical College (AGUMC), Maharashtra, India
[3]National Institute of Unani Medicine (NIUM), Bangalore, Karnataka, India

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***Correspondence:**
Dr. Mohd Danish Mohd Nasim Ansari,
E-mail: ansaridan639@gmail.com

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ABSTRACT

Abul Qasim al-Zahrawi (936–1013 CE), widely known as *Albucasis*, is regarded as the founder of operative surgery and a central authority in *Ilm ul-Jarahat* within Unani medicine. His encyclopedic treatise *Kitab al-Tasrif li-man 'ajiza 'an al-ta'lif*, particularly its surgical section, represents one of the earliest systematic and illustrated accounts of surgical techniques, instrumentation, and wound management. The Indian Urdu translations of this work have preserved its authenticity and ensured its continued relevance. This review article synthesizes classical knowledge from *Kitab al-Tasrif* with Indian Unani literature, incorporating authentic clinical statements, standardized Unani terminology, and detailed descriptions of surgical instruments (*Aalat-e-Jarahat*) and their applications. *Al-Zahrawi's* contributions encompass cauterization, suturing, wound management, lithotomy, orthopedic procedures, obstetric interventions, and the design and application of specialized surgical instruments. His systematic approach to operative procedures and emphasis on anatomical knowledge, precision, appropriate instrumentation, and postoperative care demonstrate the sophistication of medieval Islamic surgical practice. His work continues to represent an important historical foundation for the development of surgery and remains relevant to the teaching and preservation of Unani surgical knowledge.

Keywords: *Abul Qasim al-Zahrawi, Kitab al-Tasrif, Ilm al-Jarahat*, Unani medicine, Surgical instruments

INTRODUCTION

The development of surgery as a scientific discipline is closely associated with *Abul Qasim alZahrawi*, whose work in 10th-century Córdoba transformed operative practice into a structured science. Within the Unani system, *Ilm ul-Jarahat* is undertaken when conservative treatment (*Ilaj bil Dawa*) fails and operative intervention *(Ilaj bil Yad*) becomes necessary.[1-4] His writings emphasize that surgical practice must be based on sound anatomical knowledge and clinical expertise. Historical studies of *al-Zahrawi* have emphasized his exceptional contribution to operative surgery, surgical instrumentation, and the systematic documentation of surgical procedures.[5-8]

Al-Zahrawi clearly states: "The surgeon must possess complete knowledge of the structure and functions of the organs, because performing surgery without anatomical knowledge leads to serious and often fatal errors".[1]

This foundational principle establishes *Tashreeh al-Badan* as essential for safe surgical practice. His emphasis on anatomical understanding was particularly significant because operative procedures require accurate knowledge of the location, structure, and relationships of

organs and tissues. His surgical treatise subsequently became an important source for later physicians and surgeons in both the Islamic world and Europe.[5,8]

CONCEPTUAL FRAMEWORK OF ILM UL-JARAHAT

In Unani medicine, *Ilm ul-Jarahat* represents a specialized field requiring both theoretical understanding and practical skill. *Al-Zahrawi* emphasized caution and precision, advocating that surgery should only be performed when absolutely necessary. His approach reflects the Unani principle of maintaining physiological balance (*I'tidal*) and avoiding harm.[1-4]

Indian Unani scholars have further elaborated these principles, reinforcing that a surgeon must combine knowledge with experience to ensure patient safety.[2,4] The systematic approach of *al-Zahrawi* is particularly evident in his description of surgical procedures according to the disease condition, anatomical site, operative requirement, and appropriate instrument.[5,6,8]

The surgical philosophy presented in *Kitab al-Tasrif* demonstrates that operative intervention was not regarded simply as a mechanical act. Rather, it involved assessment of the patient, selection of an appropriate procedure, preparation of the operative site, selection of suitable instruments, execution of the operation, control of complications, and subsequent wound care. This integrated approach provides an important historical perspective on the development of organized surgical practice.

SURGICAL TECHNIQUES IN KITAB AL-TASRIF

Al-Zahrawi described numerous operative techniques in the surgical section of *Kitab al-Tasrif*. The final volume of this extensive medical encyclopedia is devoted primarily to surgery and contains detailed descriptions and illustrations of surgical instruments and procedures.[5,8] His descriptions cover soft-tissue procedures, cauterization, wound management, lithotomy, orthopedic procedures, obstetric interventions, and other specialized operations.

Kayy (Cauterization)

Al-Zahrawi described *Kayy* as a powerful therapeutic method for controlling hemorrhage and treating chronic diseases. However, he emphasized its cautious use: "Do not apply cauterization in every condition; it should only be used when other treatments have failed, for it may cause harm if used unnecessarily".[1]

This reflects an early form of rational clinical decision-making and risk assessment.[1,9,10] *Al-Zahrawi* described different forms and applications of cauterization and developed specialized instruments for performing the procedure. His approach indicates that *Kayy* was not intended to be applied indiscriminately but according to the clinical indication and anatomical circumstances.

The use of cauterization for control of bleeding is particularly important in the history of surgery because hemorrhage has historically represented one of the major dangers associated with operative procedures. *Al-Zahrawi's* attention to the control of bleeding illustrates his practical understanding of operative safety and demonstrates the importance he attached to preventing complications during surgery.[5,9,10]

Khiyata (Suturing) and Tadbeer al-Jarahat

Al-Zahrawi introduced advanced suturing techniques using absorbable materials and emphasized proper wound care. He writes: "The wound should be sutured in such a way that its edges are properly approximated, so that healing may occur without complication".[1]

Furthermore, he highlights the importance of postoperative care: "After suturing, the wound must be treated with appropriate dressings and carefully observed, because neglect after the operation leads to failure of treatment."[1]

These statements reflect a comprehensive understanding of *Tadbeer al-Jarahat*, including cleaning (*Tanqiya*), dressing (Zamad), and monitoring wounds.[1,11,12] The description of suturing and wound management demonstrates that *al-Zahrawi* recognized the importance of accurate approximation of wound edges and appropriate postoperative management.

The systematic documentation of suturing techniques is among the important features of *al-Zahrawi's* surgical contribution. His work also reflects the broader development of operative techniques in Islamic medicine, in which physicians incorporated practical experience with the accumulated medical knowledge of earlier civilizations.[5,8]

SURGICAL INSTRUMENTS (AALAT-E-JARAHAT) AND THEIR CLINICAL APPLICATIONS

A major contribution of *al-Zahrawi* is his systematic classification and illustration of surgical instruments. He emphasized: "Every procedure requires its own suitable instrument, and the surgeon must select it according to the nature of the operation".[1]

The surgical section of *Kitab al-Tasrif* is particularly renowned for its extensive illustrations and descriptions of surgical instruments. Modern historical analyses have identified more than 200 instruments illustrated or described in relation to different operative procedures.[5,6,8] These instruments demonstrate that *al-Zahrawi* understood the importance of matching the design and

function of an instrument to the requirements of a particular surgical procedure.

The *Mishrat* was used for precise incision (*Qata*) of tissues, while instruments described as *Miqta* were used for deeper dissection. The *Miqrad* was used for cutting tissues and sutures, and the *Milqat* was used for grasping tissues and extracting foreign bodies. The *Kullab* served as a hook for retraction and exposure, whereas the *Misbār* was used for exploring wounds and operative areas. The *Mikwāh* was used for *Kayy*, and the *Qanula* was used for drainage and related procedures. The *Mijrad* was used for scraping or removing unwanted tissue, while the *Minshar* was used in procedures involving bone.[1,3,5,6,8,13]

The diversity of these instruments demonstrates a highly advanced understanding of surgical specialization.[3,5,13] The selection of different knives, probes, forceps, hooks, scissors, cautery instruments, and bone instruments according to the operative requirement indicates that *al-Zahrawi* regarded instrumentation as an essential component of surgical skill rather than merely an accessory to the procedure.[5,6,8]

Historical analysis of the instruments described in *Kitab al-Tasrif* has further demonstrated that *al-Zahrawi's* knowledge of surgical instrumentation developed within a broader intellectual and medical tradition. His descriptions nevertheless represent a major stage in the systematic documentation and classification of operative instruments.[6]

APPLICATION OF INSTRUMENTS IN SURGICAL PROCEDURES

In *Shaqq al-Hasat* (lithotomy), *al-Zahrawi* used *Misbār* and *Milqat* for locating and removing bladder stones.[1,14,15] The detailed account of urinary bladder stone extraction provides valuable evidence regarding the practical application of specialized instruments during operative procedures.[15] Historical comparisons of lithotomy techniques and instruments have demonstrated the importance of *al-Zahrawi's* description in the development of urological surgery.

In the description of the treatment of fractures and bone dislocations (*Jabr wa Tadeel*), instruments such as *Minshar* were used for bone procedures.[2,16] Orthopedic interventions described within the surgical tradition included management of fractures and other disorders requiring mechanical correction. The combination of manipulation, stabilization, and appropriate instruments reflects the practical character of *Jabr wa Tadeel* within *Ilm ulJarahat.*

Al-Zahrawi also described operative techniques for managing difficult labor, demonstrating his expertise across surgical specialties.[1,17] His surgical writings provide historical evidence of the involvement of operative techniques in obstetric practice during the Islamic Golden Age. The management of difficult or abnormal labor required considerable clinical judgment and an understanding of maternal and fetal anatomy.[17]

The breadth of procedures described by *al-Zahrawi* illustrates the multidisciplinary nature of his surgical practice. His work extended beyond a single operative specialty and included procedures involving the urinary system, musculoskeletal system, soft tissues, obstetrics, and other anatomical regions (*Nizām-e-Baul, A'ḍā-e-'Aẓm wa 'Aḍal, Ansaij-e-Layyinah, Ilm ul- Qabalat, Mawāḍi'-e-Badan*).[5,18-21]

POSTOPERATIVE CARE AND CLINICAL INSIGHT

Al-Zahrawi emphasized that surgery does not end with the operation. Proper postoperative care is essential for successful outcomes. His instructions on wound management and patient monitoring reflect a holistic approach that aligns with modern surgical principles.[1,12]

The emphasis on postoperative management is important from a historical perspective because surgical success depends not only on the technical execution of the procedure but also on wound care, observation, prevention of complications, and appropriate follow-up. *Al-Zahrawi's* descriptions therefore demonstrate an understanding of surgery as a complete therapeutic process rather than an isolated operative event.[1,5,8,11]

His surgical philosophy also reflects an awareness of the potential dangers associated with unnecessary intervention. The preference for careful assessment and appropriate indication before surgery represents an important component of responsible clinical practice. Such principles remain relevant to contemporary surgical education, where patient selection, risk assessment, operative planning, and postoperative monitoring are fundamental components of surgical care.[7,9,10]

DISCUSSION

The surgical contributions of Abul Qasim al-Zahrawi extend beyond technical innovation to the establishment of a rational and methodical surgical philosophy. His insistence on anatomical knowledge as a prerequisite for surgery reflects an early form of scientific rigor and aligns with later developments in anatomical science.[1,2,5,8] Furthermore, his emphasis on selecting procedure-specific instruments (Aalat al-Jarahat) demonstrates one of the earliest recognitions of specialization in surgical practice, a principle that remains fundamental in modern operative disciplines.[3,5,6,8,13]

Al-Zahrawi's cautious approach toward *Kayy* (cauterization) highlights an understanding of risk management and therapeutic indication, which parallels contemporary evidence-based decision-making.[9,10] His detailed description of *Khiyata* (suturing) and *Tadbeer al-*

Jarahat (wound management) indicates an advanced comprehension of tissue healing and infection prevention, predating modern surgical asepsis.[5,11,12] In addition, his work on *Shaqq al-Hasat* (lithotomy) represents a milestone in the evolution of urological surgery, providing one of the earliest systematic operative techniques for bladder stone removal.[1,14,15]

The integration of orthopedic principles (*Jabr wa Tadeel*) further demonstrates his multidisciplinary approach, combining mechanical understanding with clinical application.[2,16] His contributions to obstetrics under *Ilaj bil Yad* reveal his ability to adapt surgical techniques to diverse clinical scenarios.[1,17] Importantly, his emphasis on postoperative care underscores a holistic view of patient management, recognizing that surgical success depends on both operative skill and aftercare.[1,12]

The historical importance of *al-Zahrawi's* surgical work is also supported by modern studies examining specific areas of his practice. His descriptions have been discussed in relation to neurological surgery, plastic surgery, gynecomastia surgery, urological surgery, obstetric practice, and other operative fields.[15,18-22] These studies demonstrate that his work was not limited to theoretical discussion but contained detailed descriptions of procedures and instruments with recognizable clinical applications.

The survival and transmission of *al-Zahrawi's* surgical knowledge through Arabic and later European medical traditions further emphasize his historical importance. His work became an important reference for subsequent surgeons, and the illustrated presentation of instruments contributed to the transmission of practical surgical knowledge.[5,8] The availability of critical editions and translations has also allowed modern scholars to examine his original surgical descriptions in greater detail.[8]

Collectively, these contributions establish *al-Zahrawi* not only as a pioneer of surgical techniques but also as a foundational thinker who shaped the principles of safe and effective surgical practice. His combination of anatomical knowledge, operative technique, specialized instrumentation, clinical judgment, and postoperative care represents a comprehensive surgical philosophy that remains important in the historical study of medicine.

CONCLUSION

Abul Qasim al-Zahrawi laid the foundation of modern surgery through his contributions to *Ilm al-Jarahat*. His integration of clinical reasoning, surgical techniques, and instrument design continues to influence both traditional Unani medicine and contemporary surgical science. His *Kitab al-Tasrif* represents an extraordinary historical record of operative practice and surgical instrumentation, while its continued study provides an important bridge between classical Unani medical knowledge and the history of modern surgery. *Al-Zahrawi's* emphasis on anatomical knowledge, appropriate indications, specialized *Aalat al-Jarahat*, careful operative technique, control of hemorrhage, *Khiyata, Tadbeer al-Jarahat*, and postoperative care demonstrates the depth and systematic nature of his surgical thought. His work therefore deserves continued academic study within *Ilm al-Jarahat*, the history of medicine, and the broader development of operative surgery.

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