



Cautery Looked through the Lens of Clinical Perspective: Indications, Contraindications, Adverse Effects and Complications

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Authors' contributions

This work was carried out in collaboration between all authors. Authors NAQ, SOS, IMAG and SMA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NAQ and SMA managed the analyses of the study. Author IMAG managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI:10.9734/JAMMR/2018/42035

Editor(s):

(1) Thomas I. Nathaniel, University of South Carolina, School of Medicine-Greenville, Greenville, USA.

Reviewers:

(1) Syed Mohd Abbas Zaidi, HSZH Govt. Unani Medical College, India.

(2) Maria Lúcia S. G. Jorge, Federal University of Paraná, Brazil.

(3) Ana Carolina Urbaczek, University of São Paulo, Brazil.

Complete Peer review History: <http://www.sciencedomain.org/review-history/25004>

Review Article

Received 4th April 2018

Accepted 5th June 2018

Published 7th June 2018

ABSTRACT

Background: Cautery (in Arabic Kaiy) is an ancient healing practice and indicated in a variety of diseases around the world.

Objective: This review aimed to describe and synthesize the literature on clinical perspectives of cautery specifically indications, contraindications, complications and adverse consequences.

Methods: Electronic searches of three databases (Pub Med, MEDLINE, Google Scholar, Ovid SP) using the Boolean operators and keywords were conducted and a number of pertinent articles (N=9256) published in scientific English literature were retrieved for extensive appraisal by two independent reviewers. Finally 84 articles were included in this narrative review.

Results: Cautery is reported to have definite indications and contraindications along with

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certain adverse effects and complications. The adverse consequences or complications mostly occur when cautery is used in patients with potentially complicated multiple physical diseases by unqualified and untrained traditional healers and professionals.

Conclusion: Cautery, a well-recognized complementary and alternative therapy used in many diseases is very safe in the hands of trained experienced professionals and traditional healers. Although cautery is recommended as a last choice in resistant complicated medical and surgical conditions, many patients with variegated diseases first consult traditional practitioners due to their unique culture and strong belief system and vice-versa is also factual. This study calls for conducting rigor research for assessing its outcome in prioritized medical-surgical conditions and elucidating its underlying basic mechanisms of actions and effects.

Keywords: Traditional cautery; indications; contraindications; adverse effects; Kaiy; mechanisms.

1. INTRODUCTION

The long-standing historical practice of traditional cautery is documented in diverse ancient cultures, and its earliest reference is found in Surgical Papyrus (1550BC) in Egyptian society [1-4]. Cautery considered religious therapy is known to have checkered history and was diminished in early 1800 century but revived in late 1800-1900 AD in the world [5]. In the remote past, several ancient cultures across the world recognized fire as a powerful remedy for many ailments including cancer and also ritually worshipped it [6-9]. Hippocrates recommended its applications in many medical conditions such as hemorrhoids and sciatica [1,10-12]. Traditional healers in Arab world also used cautery for a variety of diseases including stopping bleeding [6]. Presently, cautery is used mostly in difficult-to-treat cases not cured by modern treatments [6,13]. Additionally, patients' with certain characteristics have their own choice to seek help at first hand from traditional healers for any disease, who intervene using cautery especially in rural settings. Traditional healers mostly use a piece of wood or palm or nail or iron rod or oil or herbs for the purpose of cauterization.

The prevalence of cautery use varies in different age groups across diverse cultures [14-17]. In Saudi Arabia, honey was most frequently used apitherapy among the participants (39%) followed by herbal medicine (32%), bloodletting (14%) and cautery (3.4%). Nearly 77% of participants were satisfied with alternative treatments. Subjects' choice for CAM modalities was motivated by family dynamics, experiences and the use of traditional medicines [14]. In another study, most frequently used traditional therapies were Quranic remedy (50%) followed by honey (40%), black seed (39%), myrrh (bitter gum, 35%), fenugreek (25%), herbs (19%), and

cautery (7%). Females were main users of alternative therapies, and this epidemiological trend was attributed to perceived failure of modern treatment, success of alternative medicine (AM), choice of natural products and long appointment intervals to see physicians [15]. In Libya, 60% of patients (sample size=50 patients) with low education driven by their relatives/family members (90%) were found to use traditional cautery and 36.5% of patients showed improvement. Keloid, disfigurement, infected wounds, burns and multiple scars were the main adverse effects. Complications were noticed among those who were already suffering from complicated diseases such as diabetes (gangrene) and cancers including of lung, uterine and colon [16]. Traditional cautery is not recommended to treat such complicated cases, and we emphasize that the cautery needs not to be blamed for producing potentially dangerous complications. The unqualified untrained healers [5] and complicated nature of these diseases mainly contribute to various complications concerning cautery [18]. Watts reported that 22% of pediatric patients with a variety of syndromes attending orthopedic clinics had cautery in the past mainly for neurodevelopmental conditions and polio [17]. In Somalia, almost all people are cauterized during childhood or as adults for most common diseases such as hepatitis, facial paralysis, parotitis, and rickets [19]. Elaobda (2016) reported that 36% of Muslim Bedouin participants, mostly men, were cauterized in the past and a significant number of them were elderly patients [20]. However, Al-Binali reported that in general traditional therapies are becoming increasingly popular even in high income countries being used by 33% to 42% of the general American population [21]. Overall, the prevalence of cautery use globally varies in different cultures and predicted by several epidemiological factors.

1.1 Aim of the Study

The aim of this review was to critically analyze and synthesize the pertinent literature on clinical perspectives of cautery especially its indications, contraindications, adverse effects, and complications. The significance of this study is that it will support and scale up the precise practice of cautery along with a focus both on relevant research and training directed towards patients, traditional healers and health professionals. Furthermore, this clinical review will bridge the knowledge and treatment gap of traditional healers and health professionals along with safety and aseptic perspectives concerning cautery. Another important point is that it is the first review of clinical perspective of cautery (in Arabic Kaiy) from Saudi Arabia and will update the knowledge of concerned practitioners.

2. METHODS

2.1 Search Strategy

The relevant literature published in English prior to 2018 was searched in PubMed, MEDLINE, Google Scholar, and OvidSP databases. The Boolean operators and keywords used in multiple electronic searches were "Cautery AND cauterization OR Kaiy OR Amal-i-Kaiyy OR indications OR contraindications", "cautery AND "adverse effects" OR "complications", and "cautery AND modern cautery". The search strategy and the keywords were modified as appropriate according to the searched database.

In addition, references included in full text articles, some traditional medicine (cautery) books and treatises on cautery were reviewed for inclusion in this review.

2.2 Search Results

More than 9256 articles were retrieved and reviewed by two independent researchers (NAQ & SMS). Our focus was on full articles describing clinical features of cautery. However, we also reviewed articles that gave specific descriptions of indications, contraindications, adverse effects and complications of cautery. These brief sketches were reviewed critically and their important contents were incorporated in this review. The additional inclusion criteria were free access to full articles, papers containing salient detailed clinical perspective of cautery and all types of studies such as systematic reviews and meta-analysis, randomized clinical trials, observational studies, case series and single case reports. After removal of duplications (n=5401), clinical details unavailable (n=1608), no abstract (n=159), non-English articles (n=25), incomplete papers (n=209) and full articles not accessible (n=1512), only 342 papers were left for further review. A number of articles (n=258) were excluded because of duplications of pertinent clinical information (n=228) and containing irrelevant information (n=30). Finally, both reviewers agreed to include 84 published studies, including some traditional books on cautery in the present narrative review. Now the total number of included studies is 84 (Fig.1).

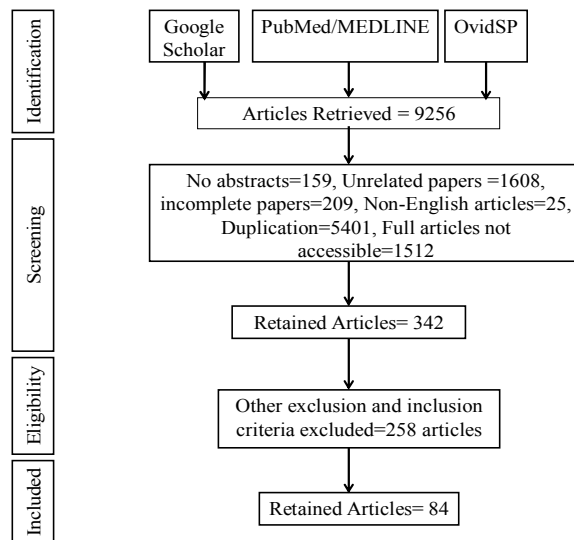


Fig. 1. The flowchart of selection of articles

3. RESULTS

3.1 Purpose of Cautery

Cautery has multiple important purposes. Cautery limits superficial and deep seated infections from spreading to healthy tissues. Cautery also aims to equivocally prevent spread of malignant cancer cells to other body organs. Superficial or cutaneous cauterization targets effectively the chronic skin lesions not responding to medical treatments. Cautery is used to stop bleeding from vessels, nose and other organs. Another purpose of cautery is to destroy the gangrenous and ischemic tissues and badly infected or putrefied or septic muscles or other unhealthy body parts. Cautery tends to distribute heat to cold temperamental organs in the body simulating the mechanism of qi energy [22,23]. Cautery is used for cosmetic purposes such as tattooing, piercing and fine bloodless incision making in surgery. Overall, cautery serves many objectives if used appropriately by trained experienced traditional healers as well as health professionals in patients with a variety of health conditions around the world. The last but not the least, the use of cautery perpetuates the tradition of Prophet Mohammad (PBUH). Prior to using cautery, healers and professionals should inform the patient about pros and cons of cautery in a particular disease and must take written consent signed by consumers.

3.2 Cauterisation

In traditional cautery, cauterization procedure is meant for destroying the unhealthy tissue or clotting vessels to control bleeding by using heat, medicinal herbs and chemicals. On the other hand, modern cautery such as electrocautery (thermal cautery), diathermy or electrosurgery that utilize high frequency electric (or electromagnetic) current (direct or indirect) to produce heat is commonly used to stimulate circulation, relieve pain, destroy unhealthy tissue and to achieve hemostasis by clotting the small bleeding vessels. In general, electrocauterization technique aims to destroy unhealthy tissues by heat, electricity, laser, freeze or chemicals [24]. In primary healthcare, common skin indications for electrocauterization include viral warts, cherry angiomas, and sebaceous hyperplasia [24]; however, various other indications including small benign lesions and cancers concern several specialties [25]. It is important to exclude a number of diseases including anaemia,

diabetes mellitus, and cardiac disease prior to using electrocautery which in fact differs from electrosurgery.

Electrocauterization requires local anaesthesia, and then a small electrode is applied to the skin. A grounding pad should be applied to the patient's thigh for insulation and protection against short-circuiting and burn. The practitioner uses electrode with high frequency electricity current at its tip, and cauterize the lesion. Each cauterizing cycle only takes few seconds. Some lesions such as warts or seborrhoeic keratoses first need curettage followed by cauterization of the base [24]. Complications of electrocautery (thermal cautery) include injury to the adjacent healthy tissues, injury to blood vessels and nerves, scarring, but no interference with pacemakers and implantable cardioversion defibrillators [26]. Other reported complications of electrocautery are wound infection, impaired healing, and worse wound cosmesis but this systematic review refuted these negative consequences compared to scalpel incision [27] and ventricular fibrillation due to low-frequency leakage current from the electrocautery device [28]. Healing is always by secondary intention, i.e., when wound edges are not approximated by sutures, staples or glue as in electrocauterization. Chu et al (2005) suggested that electrocauterization should be done in individual patient with confirmed diagnosis because of unavailability of biopsy material [24].

Modern cautery developed with the invention of traditional cautery (1550BC) and then came electrical diathermy. This form of cautery produces heat in a controlled way [29]. This technique became a very common practice to date for stopping bleeding during surgery. Currently many forms of cautery and cautery devices are used in medical and surgical sciences; electrocautery (or thermal cautery-unipolar and bipolar), chemical cautery (silver nitrate, trichloroacetic acid and cantharidin), and electrosurgery including electrocoagulation, electrofulguration, electrodesiccation and electrosection are recommended in various diseases concerning dermatology, ophthalmology, otolaryngology, plastic surgery, urology, cardiology, neurology, and obstetrics and gynecology [25,26,30,31]. In this article we have presented a snapshot of electrocauterization because a paper concerning modern cautery and its different types with uses in healthcare will be forthcoming soon. We feel very strongly that the basic principle underlying

traditional cautery-heat energy-is applied in different forms in all types of advanced cauteries around the world. Overall, cautery in the hands of trained, qualified and experienced healer liaising with modern practitioners is a creditable therapy in the current landscape of integrative medicine paradigm across the world.

3.3 Indications

There are many indications of cautery which is used worldwide. These indications include but not limited to aneurysm, tumors, ulcers, bleeding, cranial diseases, viral warts, moles, no healing wounds, pneumonia, fatigue, stress disorders, gastrointestinal tract (GIT) diseases, fibromyalgia and musculoskeletal pain, various cancers, dog bite, inguinal hernia, polyps, oral (ulcers) and liver diseases (jaundice and viral hepatitis), splenic abscess, sciatica, coxalgia (hip joint pain), neurological diseases (facial palsy), parotitis, rickets (vitamin D deficiency), chronic inflammatory diseases, diseases of veins and tendons, backache, neurodevelopmental conditions and functional (non-organic) diseases (schizophrenia, depression) [1,4,6-10,13,18-22,32-46]. In addition, other diseases treated by cautery are hemorrhoid, abscess, dropsy (edema), trachoma, menstrual conditions, gangrene, fistulas, improperly grown eyelashes (trichiasis), entropion (lower eyelid folds inward), drooping eyes (ptosis), eye infection, unwanted skin, circumcision, polio, renal disorders, depression, hematological conditions, and apoplexy (bleeding within an organ, stroke) and acquired acneiform (closed-comedone) naevus and macrocomedones (1-3mm in diameter), ingrowing toenails and body piercing and tattooing [32,42,44,47-66]. Overall cautery has been used in many treatable and untreatable conditions of human sufferers with specified placement on body surface since ancient times and, currently, have undergone many changes with different sources of energy generation and devices innovations (Table 1).

3.4 Contraindications

There are relative and absolute contraindications of cautery (Table 2). The practice of cautery should be avoided during extremes of cold or hot weather. Extreme peaks of cold and heat interact negatively with the pre-existing conditions and diseases patients are having, and lead to abnormal physiological changes in the body together with adverse disease outcome with high mortality [67,68]. The effects of cauterization further aggravate or not these effects in tandem

with such clinical scenarios are yet to be studied. Ancient healers advocated that nerves, ligaments, tendons, and muscles should not be directly cauterized and no injury should be inflicted on these tissues [22,32,33,46]. Cauterization should not distress ligament and tendons [22] or contaminate them with toxic humor or fluid. In the same vein, cauterization should not be done near spinal cord because injury to it may cause muscular weakness or paralysis. Practitioners should take precaution to apply cautery superficially on the afflicted skin over the spinal cord so that the harmful fluid should not affect it with dangerous complications [32]. However, cautery should be done on most painful area overlying infected muscle and bone [22]. When applying cautery to infected wound, it should not be deeper and care should be taken not to cauterize healthy muscles [32] and it would be better to pair cautery with curettage. Overall tendons, ligaments, nerves, muscles, vessels and spinal cord need to be protected against any injury by cautery therapy.

Cautery practitioners should ask each patient whether or not using cardiac pacemaker, hearing aid and other electrical metal devices and infectious disease like HIV/AIDS as these are relative contraindications of cautery (modern monopolar electrocautery). There is considerable research and innovative developments concerning medical devices patient are found to use while undergoing surgical, medical and dental procedures [69]. Cardiac pacemaker and wearing hearing aid are unaffected during traditional cautery. In turn patient may develop serious complications during surgery by monopolar electrocautery. Following cautery, there might be recurrence of keloid and overgrown scars in susceptible patients. Antiseptic means discussed below need to be used strictly in case of patient with AIDS and other contagious ailments. Cautery can be performed using a piece of wood or palm or medicinal herbs or metallic nails. Metal is used to make cautery instrument that varies from gold to silver to copper to iron. Silver or copper cautery is good for non-healing ulcers and carcinoma [57]. Cautery made of gold often melts and spread all around the affected area burning the healthy tissue including nerves and vessels. Patients with crushed wounds benefit from gold cautery. Other advantages of gold cautery are faster recovery and no association with blister formation [57]. Overall, iron cautery as against all other metallic cauteries is preferred by most practitioners and professionals [63].

Controlling bleeding by cautery is a challenging maneuver. The hemorrhagic area needs to be cauterized extensively with heated cautery causing fever to the patient and no thick plaques should be left [41,56,57] in order not to stagnate the toxic or harmful humor. Alternately, thick toxic blood clots aggregation reckons a potentially dangerous condition because it blocks both the free flow of qi energy and oozing out of harmful material from the body and wound. If fever develops post-cautery means effectiveness of cauterization and this is attributed to the release of harmful toxic material from the wound into the body. This simply indicates that there should not be harmful fluid stagnation and its flow may induce possibly immune reaction associated with fever.

The cauterization of orifices such as nose, rectum, uterus and ear afflicted with various diseases especially malignancies may be looked as relative contraindications, and needs cautious approach and thoughtfulness. Therefore, practitioners cauterize diseased orifices carefully with a special shaped cautery that passes through a catheter of suitable width and wrapped with cold cloth for protecting the healthy tissue [22,23,57].

Modern cautery practitioners and professionals strictly use infection control measures based on related guidelines in surgical and medical settings when they practice electrocautery and other types of cauteries [70]. Similarly cautery professionals and healers need to take essential antiseptic steps in order to prevent the adverse effects and complications for achieving better outcome. In nutshell, most traditional and modern treatment interventions have contraindications, adverse effects, and complications, and traditional healers and professionals should be aware of them for the safety of patients around the world.

3.5 Adverse Effects and Complications

No medical intervention is without adverse effects and complications (Table 3). Traditional cautery is associated with several adverse effects and complications which are equivocal spread of infections and cancerous cells, severe pain, bleeding, burns, tetanus, infected blister, delayed wound healing, keloid, scabs, multiple scars and disfigurement [13,16,32,44,71-73]. In a study, all 74 patients (100%) who received Wasm therapy showed axillary lymph node metastasis (N1 to N3), irrespective of their T

stage (size of tumor) [73]. Cautery and infection is a debatable issue because cautery successfully treat various diseases including localized infections with severe pain [10,34,74,75]. Infection and other complications tend to develop when aseptic precautions are not taken prior to cauterization, and this happens even with electrocautery [76]. In a case series (n=10), two patients developed tetanus following cautery [71]. In another case report (n=4), skin branding with hot metal rod was linked with serious complications. Notably branding uses different sources of heat/energy and divided into many types; strike branding which is most common traditional type and uses heated metal rod, hypothermal (freeze) branding, chemical branding, electrocautery branding and laser branding. Branding commonly practiced in the western world is associated with severe complications including septic shock, cavernous sinus thrombosis, blindness, multiple splenic abscesses and death. Complications develop when patients with potentially serious diseases are cauterized on wrong places of the body by unqualified practitioners, though wrong shapes and types of cautery also contribute to the group of complications [77]. These are very rare complications of skin branding in patients with hepatitis C, exacerbated open angle glaucoma, chronic diabetes, and chronic malaria with enlarged spleen, metastatic melanoma, and cervical bleeding with cancer. Notably the larger contribution by these diseases to aforesaid complications cannot be excluded. Other complications associated with skin branding done using old and modern methods either in normal persons or individual with risk behaviors including substance abuse or with advanced diseases are reported to be hair loss, hyperkeratosis, acanthosis, squamous cell carcinoma, foreign body reaction, oral and tooth problems, aspiration and hypoxia, edema and swelling, multiple abscesses, infections and transmission of hepatitis and HIV and amputation [16,20,78-85].

Many of these adverse effects and complications are preventable as well as manageable. After effects of cautery especially scabs could be treated by topical medications and ointment made from natural products such as medicinal herbs and oils [32,41,56,57]. In addition aforesaid rare complications of cautery or branding based on some case reports and small sample size study could be reduced by qualified professional cauterists using specific aseptic procedures and antibiotics. Precise application of

Table 1. Indications of cautery

Indications	Place of cauterization	Remarks
Sleep disorders	Middle of the frontal head,	Neuropsychiatric diseases due to phlegmatic matter, use of Olivary cautery similar to olive seeds
Hemiplegia, Stupor	Middle of the frontal head, Middle of the frontal head,	Brain disease due to hemorrhage , use Olivary cautery Brain disease reflecting near unconsciousness, use Olivary cautery
Fascial paralysis	3 points–each one below the ear, temple, and at junction of lips (facial paralysis)	Neurological disease and cauterization on unaffected side
Throat pain	Below the mandible	Away from the veins and arteries, no deeper cauterization
URTI	Below the mandible	Use Olivary cautery
Asthma	Cauterisation is done on the chest or epigastrium	
Chest pain	Cautery is applied on the back and abdomen	
Melancholia	Electrolytic lesion in the ventromedial quadrants of the frontal lobes	In old and debilitated patients with major depression; use of modern cautery
Chronic migraine	Arterial branches	Good outcome; cauterization in temporal region
Headache	Middle of the head	Very effective
Seizure disorders	Middle of the head	Olivary cautery in adults & fine cautery in children
Seizure attack	Forehead between the eyebrows	During seizures, heated Coral/Marjan used
Otalgia (earache)	10-12 points around affected ear	Punctate shape cautery & little away from the ear
Entropion (eyelid folds inward)	Pluck the lashes and then cauterize the hair roots.	Use fine cautery on the affected eyelid, mostly lower eyelid
Oral fistulae	Put the heated cautery inside the fistula	Cauterization through a hollow tube (catheter) & repeat it
Ascites	Multiple points-skin overlying liver, spleen, umbilicus and stomach	In one session on all points or separate points on several sessions
Pleurisy (pleural inflammation)	Multiple cautery points and use of birthwort root; Junction of neck with clavicle, below the jugular vein, fifth intercostal space.	Other points above the stomach, center of the chest, and three points between the shoulders. Avoid deeper cauterization
Splenic diseases	Three or four points across longitudinal axis of spleen and patient in supine position, lift the skin and pierce it by heated cautery	Use two or three or six pronged cautery. In six-pronged cautery, no skin piercing is done.
Edema	Cautery the skin in between the 4th and little toes. Then cauterize one point on both heels and popliteal fossa & both the thighs two points.	In older times, the term dropsy was used for edema. Beak-shaped cautery in upright position
Backache	Use habbe-mintan and encircle the affected area and cauterize it in three sessions, if person strong cauterize the area five times in each sessions	Beak-shaped cautery is done on chest, abdomen, back, arms and legs

Indications	Place of cauterization	Remarks
Coxalgia (Hip joint pain)	Cauterize the skin overlying nerves going to the kidneys, both thighs, knees, heels, ankles and all the toes four times and keep the wound unhealed	Contaminated fluids and pus should be discharged. If hip dislocated, apply cautery 3-4 time on the affected hip, and no deeper piercing of skin
Arthritis	Cautery is done on the back and abdomen	Cauterization will depend on joint involved
Sciatica	Cupping longitudinally on affected area and both thighs first, followed by cauterization on lateral side of ankles, heels and the small toe.	Different practitioners have diverse opinion about cautery therapy of sciatica pain.
Hemorrhage	Cauterization with gold hot cautery	It is not linked with blister formation
Cancer	Excise the cancerous growth and then cauterize the area not near to the vital organs	Basel cell carcinoma recurs after excision and needs curettage and cautery
Piles	Burnt sesame seeds applied to the piles mass	Immediate relief from pain
Syphilis	Nodules in tertiary syphilis with corrosive cautery	Six corrosive agents mixed and applied on the nodules, blister formed and nodules are destroyed
Moles	Excise moles and apply hot cautery	Good results
Viral warts,	Excise wart and apply hot cautery	Good results
Gangrene	Burn the gangrene with heated iron rod	Good results
Trichiasis (eyelashes fold inward)	Pull the eyelashes and cauterize the root	Good results
Jaundice, viral hepatitis	Cautery is done on the head, neck, arms, or legs, back, and chest	Questionable results
Pneumonia (Bacterial infection)	Like in pleurisy, multiple points above the stomach, center of the chest, intercostal space and three points between the shoulders	
GIT disorders with pain (Gastritis in children)	cautery is done on abdomen, chest and legs	
Renal colic	Cautery is done on flanks	Good results
Disc prolapse	Cautery at lateral malleolus	Good results
Tubercular Joint	On the most painful area	Questionable results but pain certainly decreases
Latest indications		
Acneiform naevus	Closed-comedone naevus treated by two sessions of light cautery on the affected skin	Adjunct retinoid for local application good improvement
Ingrowing toenails	Chemical cautery with 88% phenol	Great outcome

Indications	Place of cauterization	Remarks
Body piercing-Tattooing	By electrical tattooing machine	Same principle like cautery
Haemangioma	Pulse-dye laser therapy (heat energy)	Same principle like cautery
Skin incision	Electrocautery versus cold scalpel	Electrocautery linked to good results
Facial Telangiectasias	Use of hand cautery	Good results
Lupus vulgaris, hairy mole	Use of steam cautery	Epithelioma of left ear and ulcer, satisfactory response
Non-genital warts	Curettage and cautery	The best option is salicylic acid
Snake bite	Potassium permanganate and actual cautery	Complete recovery
Vasectomy	Cautery is the effective method for occlusion	Thermal as well as electro-cauteries

URTI=upper respiratory tract infection, GIT=gastrointestinal diseases,

Table 2. Contraindications of cautery

Disease	Remarks
Non-ulcerated cancers	Untreatable and any surgical intervention including cauterization will result in death, otherwise patient might live a bit longer period; large benign tumors are exceptions
Uterine cancer	Highly dangerous to intervene surgically or treatment by cauterization (alternate treatment)
Lymphomas	Incurable malignancies or if intervene by any means including cauterization associated with high morbidity
Severe anemia	Emaciated patients should avoid taking cautery therapy
Diabetes mellitus	These patients should have controlled diabetes prior to cauterization or surgery
Cardiac disease	Patients with cardiac disease need to be stable
Cardiac pacing, hearing aid and stent	These devices are not the problem in case of traditional cautery but certainly with other types of cauteries including electrocautery
Hypertrophic scars	In case of history of such scars, cautery therapy should be avoided
Keloid	In case of history of such scars, cautery therapy should be avoided
Disease of nerves	Cautery should be avoided or cauterization superficially on the affected painful skin above the nerve (always avoid deeper cautery therapy)
Disease of ligament	Cautery should be avoided or cauterization superficially on the affected painful skin above the ligament (no deeper cautery therapy)
Disease of muscles	Cautery should be avoided or cauterization superficially on the affected painful skin above the muscle, if muscle is putrefied curettage needs to be done
Elderly patient with multiple serious diseases	Immunocompromised patients with multiple potentially serious diseases tend to develop serious complications and death following cautery, otherwise they may live longer
Coma	When patient is comatose, cautery is not recommended

Patients with difficult-to-treat cancers need to be healthy and strong for undergoing any surgical treatment or cauterization

Table 3. Complications of cautery

Complications	Remarks
Inflammation	Happens when aseptic means are not used may lead to high fever
Wound infection	Happens when aseptic means are not used causing high fever, dehydration and hospitalization
Transmission of infectious diseases	May occur when aseptic techniques are ignored with patient having HIV
Hospitalization	Cautery when done in septic situations may lead to infection and fever requiring rehospitalization
Bleeding	When blood vessels are injured or incurable cancer is treated by cautery leading to shock
Keloid	Some patients have tendency for developing keloid leading to disfigurement
Hypertrophic scars	Some patients have susceptibility for developing overgrown scars causing cosmetic blemish
Multiple marks and blemish	May lead to disfigurement
Injury to blood vessels	May lead to severe bleeding, anemia, and shock
Injury to nerves	May lead to severe pain, paralysis and disability.
Gangrene	May develop especially in diabetic patients
Burns	May develop with traditional as well as modern cautery
Spread of cancer cells	Reported in patients with breast cancer with cells spreading to axillary lymph nodes
Complications of branding done with different types of cautery	
Tetanus	These complications develop because branding is done by untrained traditional healers in seriously ill patients with multiple diseases that compromise their immune system. These complications are avoidable, and such cases are absolute contraindications for major surgery including cauterization.
Septic shock	
Cavernous sinus thrombosis	
Multiple splenic abscesses	
Permanent unilateral blindness	
Death	

cautery at a specific place concerning a specific disease may further minimize complications [1,77,86,87]. Patients with advanced diseases including malignant cancers should never take cauterization. Overall traditional cautery needs not to be blamed for adverse effects and complications. Traditional healers with no formal training and medical education and untrained professionals are accountable for causing such adversities among patients with potentially dangerous diseases. These healers need integration into mainstream integrative healthcare system and intensive training in cauterization. There is a crucial need to organize cautery campaigns with suitable informative messages directed towards patients who should know when, why and for which diseases they should seek help from traditional healers and professionals.

3.6 Critics Views

Many researchers of modern times tend to question the effectiveness of traditional cautery. This is grounded on biases including unknown mechanisms and reports highlighting a number of aforementioned complications and adverse consequences [6,17,32,46,50,53,54]. Cautery skin marks remain unclassified or miscellaneous in line with the anatomical place and disease [53]. Generally patients with chronic diseases such as chronic schizophrenia show multiple marks of cautery especially on the skull [13]. Conversely, founded on fundamental principles of traditional system, ancient physicians and healers propounded that cautery reduces the pain, treats infection and cures many diseases [8] and counter-irritation is one of the underlying mechanisms of cautery. Another view supported by traditional healers is that fire and disease cannot coexist together. Concerning efficacy of cautery, a significant proportion of Muslim Bedouin patients (about 50%) also believe in the efficacy of cautery [20]. Similar perceptions of patients about cautery are reported by other researchers [8,21]. Though the results of all studies are inconsistent regarding success rate of cautery in children and adult population [8,10,13,17,20,21,54]; pediatric patients up to 21% were cured, 50% showed improvement, 2% deteriorated and 27% showed no improvement [21]. From the perspective of experimental studies, veterinary doctors using herbs and cautery treat many animal diseases including infections and inflammatory conditions caused by bacteria, parasites and viruses [88]. Conversely, cautery is found to depress immune system and,

hence, increases animals' susceptibility for infections [89].

The ancient healers from all cultures and societies were short of fully explaining how the traditional cautery works and bring about clinical improvement in medical illnesses, though humoral theory, stagnation and qi energy, concepts of moxibustion, and religious beliefs were explanatory models since antiquity. Furthermore, Chinese researchers elucidated the underlying mechanisms of action concerning ancient practice of moxibustion which is similar to cautery in many ways. The therapeutic impact of moxibustion might be through the thermal effects, radiation effects, heat sensitive receptors, and pharmacological actions of moxa and its combustion products, and finally stimulation of heat-sensitive acupoints [90,91] and presumably traditional cautery shares most of these effects. Furthermore we speculate that acting on meridian points, moxibustion and also cautery may stimulate a number of receptors in the brain releasing various neurotransmitters that reduce the pain sensitivity and increase tolerance to pain. Further basic researches are needed for elucidating other mechanisms of traditional remedies including cautery in future.

4. DISCUSSION

This review described the clinical perspectives of cautery. There are many clinical indications- medical and surgical- in which cautery is used effectively. However the point of contention is that these indications are still valid for cautery or else taken over by modern cautery. Three views appear to emerge; 1) these indications are compelling at traditional healers' level supported by patients choices based on their cultural beliefs, family influence, cost-effectiveness, conviction in its effectiveness, failure of modern medicines and their high costs, difficulties in accessing modern services, and safeguarding and perpetuation of traditional methods. Above all and the most powerful driving wheel behind cautery use is the tradition of Prophet Mohammad (PBUH) who never prohibited cautery practice but advised it should be used as the last option for treating diseases; 2) the second view is that the enumerated indications in this review should or should not be transmitted to modern cautery, and 3) third view is that modern medicine professionals, surgical practitioners and traditional healers should complement each other concerning cautery use in various diseases. The third view looks scientifically more sound and

robust because many patients first seek help from traditional practitioners and ask for cauterization. A proportion of them ultimately go to modern professional practitioners in case of minimal benefit from traditional cautery. Many patients who are not influenced by aforesaid beliefs and perceptions tend to reverse this cycle, i.e. they first consult modern practitioners and then traditional healers in case modern medicines fail.

Traditional cautery is associated with certain complications as mentioned in this review. This is not exception to cautery because modern cauteries also linked to adverse consequences [24,26,28,76]. These reported complications are avoidable if cautery is done by an experienced qualified healer, and specifically in patients with a disease suitable for cauterization. In addition, use of aseptic means, correct shape of cautery, cauterization at a specified place and precise procedure will further minimize the occurrence of adverse effects and complications. In other words, cautery should be avoided in those patients having infectious diseases, metastatic cancers and multiple complicated diseases identified as contraindications in the present review. Overall traditional cautery, the mother of all modern types of cauteries developed on the same principle of fire-heat-energy is used widely in medical and surgical fields and, therefore, cautery therapy should not be relegated in medical sciences.

This review has some limitations. It is not comprehensive and systematic. Publication and selection biases are apparent because all relevant published papers were not accessible due to multiple reasons including high subscription charges of journals and high price for buying individual articles. The strength of this review is that it deals with some important clinical perspectives of cautery including indications, contraindications, adverse effects and complications along with necessary precautions and few snapshots of types of modern cautery. Training programs, integration into mainstream integrative medicine and campaigns directed towards traditional healers, untrained professionals and health consumers may result in improving the status of cautery and its adverse effects and complications could be minimized globally.

5. CONCLUSION

In summary, cautery a well-recognized complementary and alternative therapy used in

many diseases is effective and very safe in the hands of trained experienced professionals and qualified traditional healers who implement aseptic techniques for minimizing its adverse effects and complications. Cautery is recommended as a last choice in difficult-to-treat cases, many patients with variegated diseases first consult traditional practitioners due to their unique culture and strong belief system and vice-versa trend is also factual. This study calls for conducting globally rigor research for assessing its outcome in prioritized medical-surgical conditions and elucidating its underlying basic mechanisms of actions and effects.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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