ABSTRACT
Acharya Sushruta is the first person who gave more importance to surgical and para-surgical procedures along with medical treatment. Even though modern surgical procedures are in leading position, para-surgical procedures like Agni karma, Kshara karma, Raktha mokshana are gaining more importance. As Agni karma is simple, cost effective, complication free and drugless treatment with less recurrence nature, its gaining more popularity. Present study is on applications in various diseases and to reveal the mode of action of Agni karma with modern explanation of therapeutic cauterization.

KEYWORDS: Para surgical procedure, Agni karma, clinical applications, cauterization and its mode of action.

INTRODUCTION
Acharya Sushruta known as the ‘father of Indian surgery’ has described the various surgical procedures along with the para surgical procedures. Among them Agni karma is the one which has got more importance. Acharya Vagbhatta also has given importance to Agni karma. It is one among the 60 upakramas. In Ayurveda, treatment with heat burns is called as Agni karma or Dahan karma. Various surgical procedures, bleeding conditions and painful conditions can be treated with Agni karma either directly or indirectly with the help of different materials to relieve from different diseases.

Importance[1]: - Agni karma is better than Kshara karma due to its Kriya (action) such as Apunarbhava (diseases which cured by Agni karma does not recur). Diseases which are not cured by Bhesha, Shastra, Kshara procedures will be cured with Agni karma because of its properties like chedana, lekana etc. Agni karma can be done with different metals like gold, silver, iron, pancha loha, shalaika, metal coins, and other materials like pippali, aja shakruth, godantha and oils. In modern times also it is used and termed as therapeutic cauterization or intentional therapeutic heat burns.

CLASSIFICATIONS
Agni karma classified into three types, they are Sthaana, Dravya, Akruthi.

1) STHAANA[2]: - According to sthaana, Dvi vidha i.e., Twak, Mamsa. Other than these regions, we can also perform Agni karma on Sira, Snayu, Asthi, Sandhi.

2) DRAVYA[3]: - According to Dravya, Snigdha and Raksha
   - Snigdha Agni Karma: - Agni Karma is performed by using Madhu, Grtha, Taila to treat diseases situated in Sira, Snayu, Asthi, Sandhi.
   - Ruksha Agni Karma: - Agni Karma is performed by using Pippali, Aja shakruth, Shalaika, Godhantha to treat diseases situated in Twak and mamsa.

3) DAHANA AKRUTHI: - According to Dahana Akruthi as follows
According to Acharya Sushruta[4], they are Valaya (circular), Bindhu (dotted), Veelaka (linear), Pratisarana (rubbing, flat design).
According to Acharya Vagbhatta[5], they are Ardha chandra (half-moon), Swastika (swastika), Astha padha (eight limbs in different directions) and including all Sushruta types.

KAALA (SUITE TIME)[6]
All seasons are suitable, except in Sharad and Grishma Ritu because in Sharad Ritu (autumn) there is a prakopa of pitta which leads to various disorders due to pitta vitiation and in Grishma Ritu (summer) as it is more hot which leads to pitta aggravation. In emergency, after counteract methods like maintaining room temperature and intake of pichila anna, Agni karma can be done.
DHANANJAYA (EQUIPMENT USED)

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DISEASE</th>
<th>EQUIPMENT</th>
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<tbody>
<tr>
<td>TWAK</td>
<td>Masha (discolored patches), Tila kalaka (moles), Charmakila (warts), Rak (body pains), Stabdhi (stiffness).</td>
<td>Surya kantha (magnifying lens), Pippali, Aja Shakruth (goat’s excreta), Godantha (cow’s tooth), Shara (arrow head), Shalaka (metal rod)</td>
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<tr>
<td>MAMSA</td>
<td>Granthi (cyst), Arbudha (tumours), Arshas (haemorrhoids), Bhagandhara (fistula in ano), Ganda mala (scrofula), Slipada (elephantiasis), Antra vruddhi (inguinal hernia), Dushta vrana, Nadi vrana</td>
<td>Jambha ooustha (piece of black stone which resembles bear tongue ), Sachi (needle) and Other Shalaka (other metallic instruments)</td>
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<tr>
<td>SIRA, SNAYU, ASTHI, SANDHI</td>
<td>In diseases like tearing or cutting and professed bleeding, Nadi vrana (sinus ulcer), Improper venesection</td>
<td>Madhu (honey), Guda (jaggery), Sneha (oil, ghee, fat).</td>
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- Heat generated on heating by the different materials with an average probe of length -12 Anguli & tip - 2 Anguli.
- The materials are Gold (62°C), Silver (350°C), Copper (212°C), Iron (228°C), Pippali (57°C), Aja shakruti (45-50°C).
- Pancha Loha Shalaka made by prof. P.D. GUPTA which contains five metals, they are Copper (40%), Iron (30%), Zinc (10%), Silver (10%), Tin (10%).

CLINICAL APPLICATIONS

- **TWAK, MAMSA, SIRA**: When severe pain seen in the Twak, mamsa, Sira due to vata Vitiation, affected area should be followed with Agni karma as per site with suitable dahanam apakaranas.

- **SNAYU, ASTHI, SANDHI**: When severe pain seed in the Snayu, Asthi, Sandhi due to vata Vitiation, Site should be treated carefully with sneha, upanaha, agni karma, bandhana etc.

- **VRANA**: During the extraction of Ashmari (uretery bladder calculus), if any accidental incision to the bladder during surgery, which results the oozing of urine and bleeding may have seen, at this condition entire area should be treated with Agni Karma.

If body parts amputated completely, area should be followed with sneha (oils) and tied with stump bandage along with appropriate healing measures.

In dushta Vrana (Ucchita, Katina, Supata- Mamsa) conditions, Agni karma can be done by filling spot with ushna (hot), sneha (fat, oil, ghee), madhu (honey), madhu chista (bee wax), guda (jaggary).

- **GRANTHI** (Lymph nodes): Kaphaja Granthi should be excised even if it is in the stage of apakwa (usuppurated). After haemostasis, spot should be cauterized and fallowed with sadhyo vrana treatment.
- **ARSHAS** (Haemorrhoids): There are four major treatments in Arshas i.e. Bheshaja, Kshara Karma, Agni Karma, Shastra Karma. Piles caused by vata and kapha should be treated with Agni Karma and followed by application of Kshara. Massive pile mass should be cauterized after excision.
- **ARBUDA** (Tumors): In Arbuda, paste of Nispava, Kakula, Mamsa, dhadih (curd) should be applied. So that krisim will grow on it. when it eaten by krisim, remaining part should be scraped and Agni karma done (maggot therapy).
- **BHAGANDHARA** (Fistula in ano): In kaphaja or pariravrin bhagandara, after excision the fistula track should be burnt with Agni Karma. In Agantuja type after excision, Agni Karma should be done with Jambauostha Shalaka.
- **APACHI** (Lymphadenitis / Scrofula): After scraping the Apachi site with sharp instruments, Agni karma done at the spot.
- **SLIPADHA** (Elephantiasis): In vataja type of Slipadha, siru vyadh should be done at four fingers above the ankle, Agni karma is followed if necessary for haemostasis.
- **CHARMA KILA** (Warts): while removing the warts, Agni karma should be done at base of the warts to prevent recurrence.
- **ANTRA VRUDDHI** (Inguinal Hernia): In Antra vruddhi conditions, Inguinal region should be cauterized with Ardha chanda shalaka (semi lunar rod) to block the passage for further descending to the scotum. To prevent occurrence on other side, one should do Agni karma on opposite side at middle region of thumb skin after bhedana (incision). In vataja and kaphaja type, Agni Karma done after snayu chadana at scotal region.
- Agni karma should be used in *sira chedana* Conditions.
- **NADI VRANA**: After excision of nadi vrana, the track should be burnt with Agni Karma.
- **SHONITHA ATI PRAVRUTHI** (Haemostasis): During the extraction of Ashmari (uretery bladder calculus), if any accidental incision to the bladder during
surgery, which results the oozing of urine and bleeding may have seen, at this condition entire area should be treated with Agni karma.

- GRIDRASI (Sciatica and IVDP): In sciatica, as per Acharya charaka - Agni Karma should be done at the site of Antara kandara gulpha madhya i.e. Posteriorly 4 Angulis above the ankle joint (popliteal fossa and at the level of sciatic notch)[21] and as per Chakradatta, Yogarathnakara - Agni Karma should be done at the site of Padha Kanistakam region.

-UDARA MEDHAS[22]: If any blunt injury of abdomen and exposure of medas in the form of a wick, it should be dusted with ash of astringent plants and black soil. After ligation of medas, spot should be excise with sharp instrument heated on fire. Then applying honey and wound should be bandaged.

-PLEHA UDARA (Splenomegaly)[23]: In pleha udara conditions, wrist should be bend slightly. Agni karma should be done at the vein region of the left thumb with red hot arrow for quick reduction of spleen.

-GRANTHI (Cyst)[24]: In Kaphaja Granthi conditions, removed by excision even if unsuppurated status. When bleeding stops, spot is cauterized and fallowed by suture.

-GALA GANDA (Goiter)[25]: In Majja Gala Ganda, after incision, spot should be opened and remove the excess fat out fallowed by suture. Agni Karma should be done with Majja (marrrow), Sarpi (ghee), Meda (fat), Madhu (honey). Wound should be applicate with sarpi and madhu.

-KSUDRA ROGAS as follows
1. CHIPPA (Whit low) and KUNAPA (Paronychia)[26]: In these conditions, incision and drainage should be done followed by Agni Karma and the dressing done with Kokolyadi Dravyas.
2. KADARA (Corn)[27]: Kadara removed by excision and spot should be burnt with heated oills.
3. TILA KALAKA (Pigmented mole)[28]: Tila kalaka should be excise and then burnt with Agni Karma.
4. JATUMANI and MASHAKA[29]: Jatumani and Mashaka should be excise with heated oills.
5. VALMIKAM (Actinomycosis)[30]: After incision of valmikam, spot should be burnt with Agni Karma.

CONTRA INDICATIONS[31]
- Pitta Prakruti: Agni karma is ushna guna which leads to pitta prakopa further pitta disorders.
- Antra Shonitha (Internal hemorrhage): Rakta dridhi leads to pitta vitiation.
- Binna Kosta (ruptured viscera), Unremoved Shalaya, Durbala (debilitated person), Bala (childern), Vrana (old people), Bhira (timid people), Aneka vrana piditha (multiple wounds and multiple diseases), Aswedha (sudation contra indicated peoples), pregnant women.

PROCEDURE
-Purva Karma: Patient consent has to be taken for Agni karma treatment. Explanation of procedure to patient as to remove fear. Investigations like C.B.C., R.B.S. Inj. T.T 0.5 ml given at IM / START dose. Agni karma should be done after the patient takes Picchila Anna (slimy, cold in potency and soft food like khichidi). In cases like Muda garbhu, Ashmari, Bhagandhara, udhara, Arshas, Mukha rogas - Agni karma should be done in empty stomach because to prevent Vega Darana (bowel evacuation).[32] Pippali, pancha loha Shalaka (metal rod) gauzes, ghee, honey, source of Agni should be made ready. Patient should sit by facing east side. Examine the site where maximum tenderness. Proper cleaning of site with thiphalaka kashaya or normal saline with the help of sponge holding forceps. Selected area is covered with sterile hole towel. Selected instrument like pancha loha shalaka is heated up to red hot on a stove flame or liquid materials like ghrita should be heated up to boiling point.

-Pradana Karma: Before performing Agni karma, chanting of mantras should be done. Agni karma is performed at the selected site until Samyak dagdha lakshana appears. Agni karma procedure is depending on nature of disease and its chronicity.

-Pachat Karma: Yashthi Madhu Churna is sprinkled over heat burns area. Kumara swarasa, Yastimadhu ghrutha, Shatadhauata ghrutha, mixture of ghee and honey[33] any one should be applied over the wound with sterile gauze for to reduce the burning sensation, pain and proper healing. Avoid water contact at the Agni karma site to prevent infections. Proper wound care should be done with alternate days dressing with thiphalaka kashaya or panchawalka kashaya.

Oral medication like triphala guggulu can be advised. Proper diet should be advised. Avoid Vata vardhika ahara – vihara during the treatment and follow up period.

DURATION OF TREATMENT
ACUTE DISEASE: 2-3 sittings of Agni karma are required at an interval of 7 days.
CHRONIC DISEASE: 4-5 sittings of Agni karma are required at an interval of 7 days.

SAMAK DAGDHA LAKSHANAS[34]
TWAK: Shabidha pradurbhava, Durgandha, Twak samkocha
MAMSA: Kapotha varna, Alpa samkocha, Alpa vedhana, Sushka, Samkuchita
SIRA- SNAYU: Krishna varna, Unnata, Srava samnirodha
ASTHI- SANDHI: Aruna varna, Ruksha, Karsha, Sitra

POSSIBLE MODE OF ACTION OF AGNI KARMA[35]
Agni karma is considered as best therapy to pacify vitiated Dosas because Agni possesses Ushna, Tikshna, Sukshma, Aashukari Gunas, which are opposite to Vataja and Kaphaja properties. Agni karma was done by red hot Shalaka. The character of Physical heat of red hot Shalaka transferred as therapeutic heat to Twak Dhatu by producing Samyak Dagdha Vrana. From Twak Dhatu this therapeutic heat acts in three ways- i.e. Due to Ushna, Tikshna, Sukshma, Ashukari Guna it removes the 1) Sroto-avarodha and pacify the vitiated Vata and Kapha Dosas and maintain equilibrium. It increases the Rasa - Rakta Samvahana (Blood circulation) to affected site. More blood circulation flushes away the pain producing substances and patient gets relief from symptoms. Therapeutic heat increases the Dhathvagni, so metabolism of Dhatu becomes proper and digest the Ama Dosa from the affected site and promotes proper nutrition from Purva Dhatu and in this way, Asthi and Mayja Dhatu become more stable. Thus result precipitated in the form of relief from all symptoms. Further it can be endorsed that the therapeutic heat goes 2) to the deeper tissue like Mansa Dhatu and neutralizes the Sheeta Guna of Vata and Kaptha Dosa and in this way Vitiated Dosas come to the phase of equilibrium and patients get relief from the symptoms.

MODERN ASPECTS[34]
Cauterization is a medical term describing the burning of the body to remove or close a part of it. The main forms of cauterization used today are electro-cautery and chemical cautery.

ELECTROCAUTERY
Electro-cauterization is the process of destroying tissue using heat conduction from a metal probe heated by electric current (much like a soldering iron). The procedure is used to stop bleeding from small vessels (larger vessels being ligated) or for cutting through soft tissue. Unlike electro-cauter, Electro surgery is based on generation of heat inside tissue, using electric current passing through the tissue itself. Electro-cauterization is preferable to chemical cauterization because chemicals can leach into neighboring flesh and cauterize outside of the intended boundaries.

CHEMICAL CAUTERY
Many chemical reactions can destroy tissue and some are used routinely in medicine, most commonly for the removal of small skin lesions (i.e. warts or necrotized tissue) or for hemostasis. The disadvantages are that chemicals can leach into areas where cauterization was not intended. Some cauterizing agents are Silver nitrate, Trichloroacetic acid and Cantharidin.

POSSIBLE MODE OF ACTION CAUTERIZATION - BRAIN PATHWAY[37]
Therapeutic HEAT stimulate the LATERAL SPINO-THALAMIC TRACT(SST) which stimulate the DESCENDING PAIN INHIBITORY FIBERS(DPI), it releases ENDOGENOUS OPIOID PEPTIDE INHIBITORY FIBERS which binds the OPIOID RECEPTORS at SUBSTANTIA GELATINOSA ROLANDI and further inhibits the P-SUBSTANCE (pre-synaptic inhibition) and leads to BLOCKAGE of PAIN transmission.

According to scientist Dr. Ven Hanifi[38], Effects and Actions of cauterization as follows.

BLOOD CIRCULATION AND BLOOD PRESSURE: Superficial sensory nerves get stimulated which leads to dilatation of local blood vessels, resulting in increased blood circulation. Apart from this it also decreases the viscosity of blood and thus leads to decreased blood pressure.

NERVES: Reduce the excitability i.e., quick response to stimuli of nerves. Constriction and coagulation.

PAIN AND METABOLISM: Due to increased local metabolism, the waste products like metabolites which are produced gets excreted, which normalize the blood circulation thus resulting in reduction in intensity of pain.

MUSCLES: Rise in temperature induces relaxation of muscles and increase the efficiency of their action. The muscle fibers contract and relax more quickly when tissues are warm and the relief of pain and muscles spasm with inflammation.

5) BACTERIAL INFECTION: Inflammation is the normal response of the tissue to the presence of bacteria. The response obtained on heating the tissues augment these changes and so reinforces the body normal mechanism for dealing with the infecting organism.

6) SWEAT GLANDS: Increases the local activity of sweat glands.

DISCUSSION
In Ayurveda, Agni was well known tool for treatment either directly or indirectly. Being its 1500-1000 yrs. B.C. concept, with the advancement of science and technology, Agni karma was improved by introduction of electricity in the medical and surgical field began in 18th century. Agni karma is clinically established para surgical procedure. In Various painful conditions and disorders of Twak, Mansa, Asthi, Sandhi, Snayu, Siras and hemostasis in various surgical procedures Agni karma plays a major role and gaining more importance. Agni karma can be practiced as an effective, safe and drug less therapy. It is an ambulatory treatment modality and can be performed under daily routine practice.

CONCLUSION:
Agni karma and its uses are described in Ayurveda much earlier than its utility was discovered by surgeons & other medical branches. The technique and equipment’s have become advanced but the basic principles are same.

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