SANGYAHARAN SHODH

Special Issue : Dedicated to Late Dr. S. B. Pande, Patron, AAIM

February 2008 **Volume 11, Number 1**

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(Association of Anaesthetists of Indian Medicine)

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EDITORIAL

It was my great privilege to address 5th time as President of AAIM at the inaugural function of **11th National Conference of A.A.I.M. at Davangere.** The journey, which started from 'Kashi' in March 1997 never disrupted and we succeeded to organize 11th National Conferences without fail. This is our dedication and devotion. Our ultimate Goal is to Strengthen Ayurveda by means of developing the science of Sangyaharan. The surgical skills, which are our heritage, can be only preserved when we will develop Sangyaharan. Without help of Sangyaharan (Anaesthesia) the surgical branches e.g. Shalya, Shalakya, Prasuti Tantra & Kaumarbhrit will die. Not only to preserve our heratge but also to practice it, Sangyaharan speciality is an essential part of Ayurvdic Medical Education. Our dream is to develop Ayurveda as a **Total Health System** with help of integration of modern advances, technologty and medicine too. We should not hesitate to use modern technology or medicine within limitation/requirement. It is a matter of proud that our vision is accepted by CCIM and now Sangyaharan and Vikiran is included in gazette published on 3rd Feb. 2005. Now every P.G. institute can start P.G. Courses in Sangyaharan and Vikiran. Without these two specialities the P.G.Courses in Shalya, Shalakya, Prasusti Tantra, & Bal Roga are incomplete. The Postgradute can not get adequate surgical knowledge and skill without these two specialities. Therefore I appeal to the authorities to start P.G. Courses in Sangyaharan & Vikiran in their Postgraduate Institute. At the lebel of undergraduate too, basic knowledge of these two specialties are essential but I am sorry to write that even after inclusion in U.G. Syllabus there is lack of adequate teaching of topics related to these specilities. The authorites should take initiation and shoud create post of Lecturer in these subjects at U.G. & P.G. lebel.

I would like to thank **Dr. Satish B.G., Dr. S. Bhat and the members of management of Ayurveda College Davangere** for holding the 11th National Conference very successfully.

I am also thankfull to **Dr. R.K Jaiswal, M.O. Anaesthesia (Indian Medicine) S.S.H.**, IMS, BHU, for holding Sangyaharan Day on 6th Feb. 2008. The two orations which were hold at this occasion are included in this issue of Journal.

I hope that our Association will continue working for the development of Sangyharan and ultimately for the development of Ayurveda in total.

Jai Hind **Jai Sangyaharan** **Jai Ayurveda**

Devendra Nath Pande
Chief Editor

Anushastra Karma - Parasurgical Therapy

Raktavishravana – SIRAVYADHA

Dr. D.N. Pande, Reader & Head, Departt. Of Shalya Tantra, I.M.S., B.H.U., VARANASI.

Introduction and History

Sira: Sira, Nadi and Dhamani are maintaining the life of living being. Samhita period is known for Astang Ayurveda where surgery was very well popular in ancient India.

Atharvaveda has documentary evidence for the knowledge of circulatory system, which has been established the intense flow of water, colour like "Aruna Rohit, tamra, Dhum" upwards downwards and peripheral towards "Jala-Sindu" (Ath.Ved. 10/2/11). The carrier for this coloured fluid are known as Dhamani and Shira. The blood flowing in Sira differs from the blood of Dhamani (Ath. Ved. 10/2/11) Dhamani carries the bright red colour fluid whereas Sira carriers copper red colour fluid. (Ath.Ved. 10/2/11).

Dhamani and Sira were differentiated throughout the classical period, though some of them differs. Some of them were of the opinion that there was no basic difference in Sira, dhamani and srotasa and they were synonym. However, Samhita-kar like Sushruta, Caraka and Vagbhata presented the clear opinion about the differentiation between Sira, Dhamani and Srotasa (Ch. Su. 30/11; Su. Sha. 7/4; As./ H. Sha. 3/39).

The fundamental difference between Dhamani v/s Sira and Srotasa is act of Dhamana or pulsation. Thus, Dhamani is recognized by Dhamana action (Ch. Su. 30/11-12; Su. Sha. 7/2). The school of Sushruta observed that Sira ought to differ from Dhamani due to its origin, function, properties and classical observation.

Sira is the tubular structure, where 'Saran' is performed and through this Rasa Dhatu in fluids from flows through Sira. The Sarana in this reference explains the flow of various fluids through Sira onwards. Srotasa are the structures through which Sravana occurs. Sravana is the permeation of various fluids through the pores present in the wall of Srotasa. This explains the osmosis or permiasis, the veins spread in body like venules in leaf. Root of Siras is Nabhi according to Ayurveda, because from Nabhi they spread upwards, downwards and obliquely. They nourish the body like river and streams in term of Jala-Harini (Su. Sha. 7/3).

They can be classified under four groups like :

- Vatavaha - 10 in number
- Pittavaha - 10 in number
- Kaphavaha - 10 in number
- Raktavaha - 10 in number

The Siras were also classified as per regions as like – Each limb has 25 Sira, Kostha consists of 24 Sira and Urdhvajatru has 41Sira.

Thus, total 700 Siras were identified in classical period (Su. Sha. 7/8; As. H. Sha. 3/18-19, 34-38; Ch. Sha. 7/14). The school of Sushruta mentioned few selected fatal veins out of total veins. Avedhya Sira are important for surgeons because of trauma during surgery will

be fatal (Su. Sha. 7/20; As. H. Sha. 3/20-24). This also infers that school of Sushruta was advanced in vascular surgery. They were aware of these Siras which need care during surgery.

Vedhya – Avedhya Siras

These terms explain the proper care veins during surgery.

Acaryas described VEDHYA SIRAS are those which can be interfered during surgical process. They present no serious complication, when affected. It is mentioned that the safer blood letting can be done through these for veins treatment of various diseases.

The injury must be avoided on AVEDHYA SIRAS during surgery.

In Vedic period, there is no mention about Avedhya or Vedhya Siras. Though they mentioned that in vascular injury the outflow of the blood should be checked immediately. - (Ath. Ved. 6/9012/7; 36/2; 10/17/1).

In Samhita period Caraka mentioned two Vedhya Sira in reference to the treatment of Unmada, Vishamajwara and Apasmara at two places i.e. Sankha Pradesa and Kesanta Pradesa (Ch. Chi. 9/66).

The school of Sushruta mentioned Vedhya Sira especially in relation to the diseases which are cured by Siravyadha e.g. In Grdhrasi. The Sira of Janu are considered as the Vedhya Sira, when these are flexed and tourniqueted they proliferates. It means they all are superficial veins, which are used for Siravyadha to purify the Dusita Rakta.

Astanga Sangraha and Astanga Hridaya also mentioned Vedhya Sira but they described them in connection with the disease. There is mention of specific sira for a particular disease they mentioned the Vedhya Sira in there respective places of Roga. The Sira should be visible (As. S. Su. 36/4-27; Sha. Sam. 22/16).

However the Avedhya Siras are the vessels which are prohibited for the Siravyadha.

The vascular injuries are reported in Vedic literature but there is no description of Avedhya Sira (Ath. Ved.).

It appears that school of Caraka for the first time took task of Vedhya Siras but he didn't mention specifically the Avedhya Siras. The school of Sushruta discusses specific and detailed study of Siravyadha as well as Avedhya Siras first time in the history of medicine and surgery. He mentioned 98 Avedhya Siras and said that the physician or surgeon should take care at the time of Siravyadha or any other surgical treatment. Any truma on these structures may lead morbidity or death (Su. Sha. 7/18).

The total number of Avedhya Siras are 98; out of them 16 are in the extremities (4 in each extremity) named Jaladhara – 1, Urvi – 2 and Lohitaksa – 1 (Su. Sha. 7/20-35).

Vagbhata also mentined the number of Avedhya Siras as Acarya Sushruta, but he has slightly modified the knowledge of Avedhya Siras. His concept is that apart from these 98 Avedhya Siras, those Siras should also be included under this heading, which are oblique, short, tortuous and narrow situated in the subject (As. H.Sha. 3/34).

INDIVIDUAL AYURVEDA SIRAS OF EXTREMITES AND ITS CORRELATION WITH MARMA

1. Urvi : This is an Arvedhya Sira and is present in the middle of thigh, (Su. Sha. 7/12). Injury to this shira causes atrophy of muscles of the lower limb. It is a Vaikalyakara Sira Marma (Su. Sha. 6/25).

Vagbhata, Dalhana, Indu and Arundutta have followed Sushruta. Dr. B.G. Ghanekar has considered the probabilities of the hypotrophy of the muscles on injury to midline of thigh: The femoral vessels and saphenous nerve are the responsible structures for this. He has also stressed that femoral vessels would produce loss of blood and injury to saphenous nerve which may develop hypotrophy of the lower limb (B.G. Ghanekar – Su. Sha. Page 192, 1976).

2. Lohitaksa :

This is Avedhya Sira as well as Sira Marma according to Sushruta (Su. Sha. 7/21).

This Marma is situated above Urvi Marma and below Vanksana Sandhi (Hip joint) at the root of the Uru. Due to injury on this causes paralysis of the muscles or waisting of the Sakthi (lower limb) due to loss of blood. It is a Vaikalyakara Sira Marma (Su. Sha. 6/13). Vagbhata, Indu, Dalhana and Arundutta have followed Sushruta whereas Dr. B.G. Ghanekar has mentioned femoral triangle in respect to this Marma.

The injury of the region will produce the same condition as like Urvi (B.G. Ghanekar – Su. Sha. Pg. 192, 1976). Lohitaksa Marma involves the ilio-femoral and brachio-axial segment of the vessels.

Jaladhara, Urvi and Lohitaksa are Avedhya Sira and Sira Marma situated in upper extremities, are under the same name and decriptions (Su. Sha. 6/12; 7/26). According to Sushruta there are 400 Siras in extremIties, but only 4 Siras in each limb are Avedhya Jaladhara situated externally is one in each extremity, 3 internal Siras (2- Urvi and 1-Lohitaksa), thus total sixteen Avedhya Siras in the extremities (Su. Sha. 7/21; As. H. Sha. 3/21; As. Sa. Sha. :6/9).

This opinion does not appeared to be differed m terms of modern surgery or anatomy. He suggests Jaladhara for great saphenous and cephalic veins - Urvi, Lohitaksa for femoral artery and vein, brachial artery and vein axillary and vein (B. G. Ghanekar -Su. Sha. Page 210, 1976).

Avedhya Sira denotes prohibition of Siravyadha, if they under go trauma due to surgery or injury, they may produce pathological conditions.

INDIVIDUAL VEDHYA SIRA OF EXTREMITIES

The school of Sushruta has mentioned the Vedhya Sirs of extremities in connection of the disease which are most probably the superficial veins of the limbs. Sushruta mentioned that the disease of Grdhrasi and Visvaci, the knee and elbow should be flexed and the limb should be tourniqueted to proliferate the veins. The Vedhya Sira for Grdhrasi is four fingers (Angulas) below or above the Janu Marma and Vedhya Sira for Visvaci is four finger below or above the Koorpar (Su. Sha. 8/7).

THE VEINS OF THE LOWER EXTREMITY (Modern Reviewl

The veins of the lower limbs can be subdix.ided into two sets, superficial and deep. The superficial veins are immediately under the skin in the superficial fascia. The deep veins accompany the arteries. Both sets are provided with valves, which are more numerous in the deep than in the superficial veins. Valves are more plentiful in the eins of the lower than in those of the upper limbs.

- Gray's Anatomy 35th ed. 1973

According to A. LEE McGREGOR, the veins of the lower limb consist of three groups viz. (1) Superficial, (2) Deep, (3) Perforating

The perforating veins are communicating vessels between the superficial and deep veins. Blood is returned to 'the heart by the vis-a-tergo of the circulation and the negative pressure in the thorax, In the lower limbs an additional factor is the calf muscle known as muscle heart. The muscles of the calf region are surrounded by the dense unyielding deep fascia. Every contraction of these powerful muscles, therefore, blood pumps into the deep veins. The blood from the tissues superficial to the deep fascia enters the deep veins through the perforating veins which penetrate this fascia. There are valves near their origin and at their entrance the deep veins, the latter also being liberally supplied with valves so arranged as to allow for inward flow and for the prevention of reflux.

The Superficial Veins Of The Lower Limb

For Siravyadha procedure, we should have the knowledge of superficial veins of lower limb which we use for letting of blood.

The principal named superficial veins are the great and small saphenous veins. Most of the tributaries are unnamed.

Dorsal digital veins receive, in the clefts between the toes, rami from the planter digital veins and then join to form dorsal metatarsal veins which are united across the proximal parts of the metatarsal bones in a dorsal venous arch. Proximal to this is an irregular dorsal venous network receiving tributaries from deep veins and continuous proximally with a venous network in leg. At each side of the foot this network connects with medial and lateral marginal veins, both formed mainly be veins from more superficial parts of the sole. In the sole superficial veins form a planter cutaneious arch across the roots of the toes also drain into the medial and lateral marginal veins. Proximal to the planter arch is a planter cutaneous venous plexls, especially dense in the fat of the heel; this connects with the planter cutaneous venous arch and other deep veins, but drains mainly into thp marginal veins.

Great (Long) Saphenous Vein:

The great saphenous vein starts inferiorly (below) as a continuation of the medial marginal vein and ends in the femoral vein a short distance distal to the inguinal ligament being thus the body's "longest vein".

In ascends about 2.5 - 3.0 em anterior to the tibial malleolus. crosses the distal third of the medial surface of the tibia obliquely to its medial border, then ascends a little behind the border to the knee; proximally it is posteromedial to the medial tibial and femoral condyles, then ascends the medial aspect of the thigh; after traversing the saphenous opening it finally opens into the femoral vein. The vein is often duplicated, especially distal to the knee. It has from 10 to 20 I valves, which are more numerous in the leg than the thigh.

Tributaries:

At the ankle, the great saphenous vein drains the sole by medial marginal veins. In the leg it often connects with the small saphenous vein and with deep veins through perforating veins.

Just distal to the knee it usually has three large tributaries, one rrorn the front of the leg, a second from the tibial malleolar regicn (connecting with some of the perforating veins) and a third from the calf (communicating with the small saphenous vein).

In the thigh the great saphenous vein receives many tributaries; some open independently whilst other converge to from large named channe1s that frequently pass towards the basal half of the femoral triangle before joining the great saphenous near its termination. These may be grouped thus: one or more large postero-medial tributaries, ne or more large antero-Iateral tributaries, four or more peri-inguinal eins. Another large vessel, the antero-Iateral vein of the thigh nterior femoral cutaneous vein), usually commences from an anterior network of veins in the distal thigh and crosses thè apex and distal half of the femoral triangle to reach the great saphenous vein. As the latter transverses its saphenous opening, it is jointed by the superficial epigastric, superficial circumflex iliac and superficial external pudendal veins (Gray's Anatomy, Pg. 1596, 1945).

Small (Short) Saphenous Vein:

The small saphenous vein begins posterior to the lateral malleolus, as a continuation of the lateral marginal vein. In the lower third of the calf it ascends lateral to the tendo calcaneus, lying on the deep fascia and covered only by superficial fascia and skin. Inclining, medially to the midline of the calf it penetrates into the deep fascia within which it ascends on the gastronemius, only emerging between the deep fascia and gastronemius gradually at about the junction of theintermediate and proximal thirds of the calf (usually well below the lower limit of the popliteal fossa). Continuing its ascent it passes between the heads of the gastronemius, then proceeds to its tennination in th popliteal vein, 3.0 - 7.5 cm above the knee joint in the popliteal fossa.

Tributaries:

The small saphenous vein connects with deep veins on the dorsum of the foot, receives many cutaneous tributaries in the leg and sends several rami proximally and medially to join the great saphenous vein. Sometimes a communicating branch from it ascends medially to the accessory saphenous vein, this may be the main continuation of small saphenous. In the leg the small saphenous lies near the sural nerve. It has 7 - 13 valves, one near its termination. Its mode of ending variable; it may joint the great saphenous vein in the

proximal thigh or it may bifurcate, one branch joining the great saphenous on the other popliteal or deep posterior femoral veins; sometimes it ends distal to the knee in the great saphenous or deep sural muscular veins (Gray's Anatomy, Page 1597, 1995).

RAKTA-MOKSANA (SIRAVYADHA) - In Classical Literature

DEFINITION

Rakta-moksana means to let out the blood.

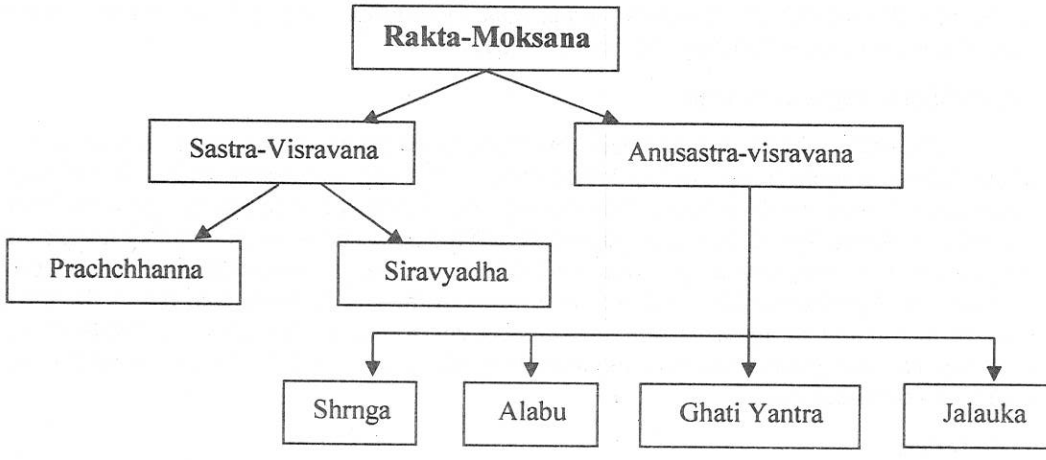
SYNONYMS

There are many synonyms for it viz.. Asra-visrti, Sonita moksana, Rakta-nirharana, Rakta-sravaJ;la, Rakta-harana etc.

PRINCIPLES OF RAKTA-MOKSANA

In Panchakarma Cikitsa, the Pravrddha (vitiated) Dosas are moved from the body whereas in Rakta-moksana to let out the Rakta Dhatu along with vitiated Dosas where Rakta Dhatu is Iredominant. The susceptibility of Rakta towards impurity is so versatile that the classics were compelled to agree upon Rakta as a fourth Dosa. Therefore Dusita (vitiated) Rakta should be let out to protect the health or to remove the disease. Since Pitta is dependant on Rakta, therefore Rakta-moksana decreases the quantum of lhanced Pitta, henceforth Dosas and Pittaja Vyadhi are too relieved or cured by the therapy (A. H. Suo -11/26).

TYPES OF RAKTA-MOKSANA



Rakta-moksana is of two types –

1. **Sastra-visravana :** It is the process which is done by the metabolic (iron) instruments. It is of two types –
   - Praccanna
   - Siravyadha (Su. Su. 14/25)

2. **Anusastra-visravana :** It is preferable for delicate persons. These methods are-
   - Jalaukavacarana
   - Singavacarana
   - Alabu Avacarana
   - Ghati Yantra

Acarya Vagbhata considered Anushastras as Jalauka, Ksara, Daha Karma, Kaca, Nakha, Patthar etc. and suggested to treat similarly.

SIRAVYADHA - Procedure

It should be done under the following procedure.

- Poorva Karma
  - ✓ Indications of Siravyadha : Swastha and Atura.
  - ✓ Contraindications of Siravyadha
  - ✓ Proper Instrumentions:
  - ✓ To make the patient fit for Siravyadha.
  - ✓ Take inform consent.
- Pradhana Karma :
  - ✓ Asana for Siravyadha
  - ✓ Consideration of Vedhya Sira according to disease
  - ✓ Observation and treatment
  - ✓ Inspection of defective Siravyadha.
- Pascat Karma :
  - ✓ Proper massage around the site of Siravyadha.
  - ✓ Dressing (tight bandaging)
  - ✓ Pathya Apathya
  - ✓ Follow up

POORVA KARMA

- **Indications :** *In Swastha (healthy person) :* Diseases of the skin, tumors, swelling and diseases arising from blood will never occur in persons indulging in blood letting (generally in Sarad Rtu) (Su. Su. 14/34).

  In Atura (diseased person) : Blood letting is the method of treatment indicated whenever Rakta Dhatu is vitiated by Dosas and in Sotha (oedema), Daha (burning), Paka (pus formation), Rakta Varna (redness of the skin), Asra Vasrti (bleeding conditions), Vatarakta (gout), Kustha (leprosy and other skin diseases), Vata diseases having severe pain, Pani Roga (diseases of the hands), Slipada (filariasis), blood vitiated by poisons, Granthi (tumours), Arbuda (malignant tumor), Apaci, Rakta Adhimantha (type of eye disease), Vidari (skin crack), Stana Roga (breast disease), debility and heavyness of the body, Raktabhishyanda (type of eye diseases), Tandra (stupor), Puti Ghrana (bad smell of the nose), Puti Asya (bad smell of body), Yakrt Pleeha Roga (diseases of liver and

spleen), Visarpa (erysipelas), Vidradhi (abscess), Pirikas (eruptions), Paka of Karna, Ostha,Ghrana, Vaktra, Siroruja (headache), Upadansa (venereal diseases), Raktapitta (perpura) (Su. Su. 14/22; Ch. Su. 24/12-16).

- **Contraindications :** Sira, should not be punctured in children the old aged, persons who are Rakta, wounded, debilitated, fearful, greatly, fatigued, wine consumed person exhausted by long walk or women (copulation), who have had vomiting or purgations, who have been administered decoction and oil enemas, who have kept awake at night, the impotent, emaciated, the pregnanat, who are suffering from cough, dyspnoea, excessive coitue, high fever, convulsions, partial paralysis, starvation, thirst and fainting.

  As blood letting is very necessary in the above mentioned diseases ideally, leeches should be applied however, Siravyadha is the last choice. Even in those who are prohibited for it, when they are affected by poisons or are in an emergency, Siravyadha can be done (Su. Sha. 8/5).

  Those veins which are prohibited from puncturing, which are invisible though indicated for puncturing, which are visible but not controlled (moving apart), which are not raised (engorged by pressure from a tourniquet etc.) though controlled (such veins should not be punctured (Su. Sha. 8/3).

  Siravyadha should not be done in very cold very hot, with heavy breeze and very cloudy days. It should not done persons (expect Sarad Rtu) (Su. Sha. 8/7).

  Aslo, those who have swelling all over thebody, who are emaciated due to intake of sour food (for a long time), who are suffering from disease such anaemia, haemorrhoids, abdominal enlargement, consumption and dropsy and the pregnant women. (Su. Su. 14/24).

- **Insturmentations :** As we know, Siravyadha is one of the Sastra Karma out of eight and same as one of the sixty Upakarma described in Sushruta Samhita. So better performance of Siravyadha and for the management of the complications, the following material should be arranged prior to the procedure i.e. proper place (atmosphere of room where Siravyadha would be carried out must be pleasant), water container, hot water, gauze piece, swabs, bandages, Sira Bandhana materials (thick rope, tourniquet etc.), sphygmomanometer, kidney trays, marking glass beaker, scalp vein (no. 20), Kutharika Sastra, Vrihimukha Sastra, oil (for Snehana), Gynaec pad (for hot fomentation), Nadi Swedana Yantra or Baspa Swedana Yantra, washing materials (spirit, Panchavalkala Kwatha etc.), chairs, dressing table; Sandhana, Skandhana, Pacana and Dahana Upakarana etc.

  To make patient fit for Siravyadha :

  - Terperature – pulse – respiration and blood pressure should be taken as prior to Siravyadha.
  - Routine blood investigations, blood group, blood sugar etc. should be carried out as pre-operative assessment of the patient.
  - Sharirika (physically) as well as Manasika (psychological state of the patient), Bala should be assessed.

- Before going to any Shodhana procedure, Ama Pacana treatment must be done; as we know that Siravyadha is also a Shodhana procedure.
- The patient should under go (Swedan and Shehan) with oily preparations. Liquid food or diet or Yavagu (gruel) should be given to him at first.

- **Take inform consent :** It is advisable to take written inform consent of the patient before going to Siravyadha as it gives information regarding the procedure to the patient and relatives. It is useful in medio-legal cases in favor of the physician.

PRADHANA KARMA (Main procedure)

- **Asana (position) and Vyadha Sthana (place) of Siravyadha :** In Gridhrasi, Siravyadha should be done with flexion of knee joint (Su. Sha. 8/8). In this position, the veins are protruding above four Angulas of the Janu Marma.

  The superficial veins at the level of four Angulas below the Janu Marma are more approachable than the level of four Angulas above. It should be done in standing position of the patient. Because in standing position calf muscles (known as muscle heart) are more active (the musculature of the calf is less than the musculature of thigh).

- **Vyadhana Pramana (Size of Puncture) :** In muscular areas, puncturing should be of the size of the Yava (barley grain) in other areas it should be ½ Yava or one Vrihi (rice by using a Vrhimukha Sastra.

  Veins over the bones should be punctured to the size of ½ Yava using a Kutharika Sastra.

- **Vyadhana Kala (suitable time) for Siravyadha :** During Varsha Ritu (rainy season), it should be done in day time (cloudless), during Grishma Ritu (summer season) it should be done at that time when temperature is minimum, during Hemanta Ritu (winter season) it should be done at mid day; these are the time of Vyadhan (Su. Sha. 8/10).

- **Vyadhana Vidhi :** Blood letting should be done by the physician on the day which is neither very cold nor very hot. It should be done with adequate sudation (Swedana) therapy. It should be done after taking Yavagu by the patient. (thin gruel) (Su. Su. 14/31).

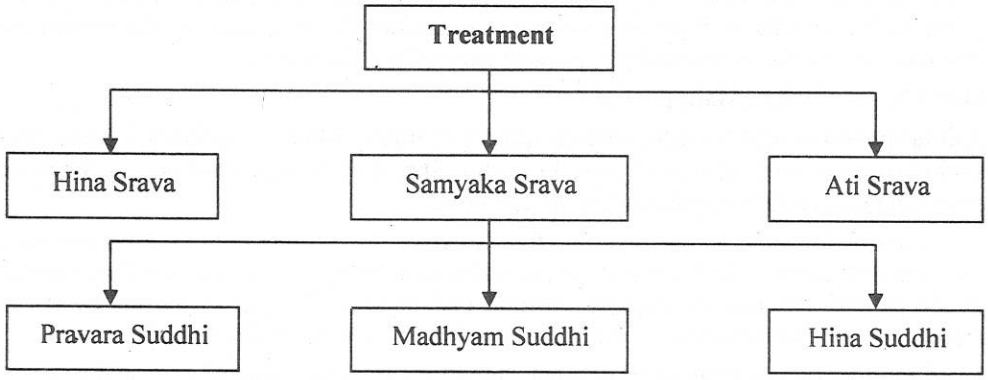
  The patient who has been undergone oleation (Abhyanga) and duly fomented (Swedana), given liquid food or Yavagu (thin gruel) at the suitable time, he should be asked to sit nearby (the physician) in erect posture; then be should be tied with either band of cloth, leather, inner bark of trees, creeper or any other material (generally we prefer thick rope than the tourniquet because it is practically seen that when body part is tightening by thick rope, Siras of that part protruding more correctly) without endangering his life. The siteof puncture should be selected and shiravyadh is done with the appropriate instrument (Su. Sha. 8/6).

- **Samyaka Viddha Laksanas (proper puncture) :** When proper Vyadhana (puncturing) has been done, blood flows out in a stream for period of one Muhurta and then stops in due time, this should be considered as proper puncturing.

  Just as yellow liquid flow out first from flowers of Kusumbha (when crushed) similarly vitiated blood flows out first when veins are punctured (Su. Sha. 8/11-12). When the blood stops by itself after adequate flow, then it should be considered as pure (unvitiated and as properly drained).

- **Srava Pramana (quantity of flow) :** In persons who are strong and have great accumulation of Dosas and who have suitable age (middle age), maximum one prastha (640 ml) of blood is allowed to flow out after Siravyadha (Su. Sha. 8/16).

Treatment :



After puncturing the vein, vitiated Rakta may flow out in the manner of inadequate quantity (Hina Srava), perfect quantity (Samyaka Srava) and more in quantity with Jiva Rakta (Ati Srava). Further Pravara Srava can be divided in Pravara Suddhi, Madhyama Suddhi and Hina Suddhi according to the characteristics or symptoms relieved by proper puncturing.

- **Hina Srava/Asrava :** Siravadha, if done in a cloudy day, if the puncturing is improper if affected with cold and breeze, if sadation is not done earlier and if it is done after meals then the vitiated Rakta does not flow out as much as reuired or flows out in little quantity. In persons suffering from intoxication, fainting and exertion, who have suppressed the urges of flatus, faeces and urine; who are in the grip of sleep and fear, blood does not flow out. (Su. Su. 14/28).

  Also in the persons who are faint, bedly afraid, exhausted or thirsty, vitiated Rakta does not flow out as well as vein is not raised by Yantrana (Su. Sha. 8/30).

- **Treatment :** If the vitiated Rakta does not flow out (due to any reason) then Ela, Sitashiva, Kustha, Tagara, Patha, Bhadradaru, Vidanga, Citraka, Trkatu, Aagaradhuma, Haridra, Arkankura (leaf buds of Arka), Naktamala Phala either three, four or as many as available or these drugs should be powdered, mixed with more quantity of salt and oil should be rubbed on the wound; in this way vitiated Rakta flows out properly (Su. Su. 14/35).

- **Ati Srava** : Siravyadha if done during the extreme heat (in summer), if sudation has been done in excess, if the puncturing is *very* much and if it done is by the ignorant (unskilled, enexperienced) then the blood flows out in large quantity; such excessive flow of blood produce headache, blineness, Adhimantha, Timira, Dhatuksaya, convulsions, burning sensatlon, hemiplegia, monoplegia, hiccough, dyspnoea, cough, anaemia up to the death.

- **Treatment:** When the blood flows out in large quantity, powder of Rodhra, Madhuka, Priyangu, Patanga, Gairika, Sarjarasa, Salmali Puspa, Sankha, Sukti, Masa, Yava and Godhuma should be sprinkled and pressed with the tip of, the finger on the wound; or

Curna of bark of Sala, SarJa, Arjuna, Arimeda, Meshashnngl, Dhava and Dhanvana; or ash of Ksauma; or powder of Samudraphena and Laksa may be sprinkled; then a bandage is tied tightly using any bandaging material mentioned; the patient should be covered with moist cloth, put in a clod room, treated with application of poultices and pouring liquids both in cold condition; or the area may be burnt (cauterized) either with Ksara or Agnikarma as described.

The same vein which have given out more blood should be cut at some distance (counter incision have done). Decoction of drugs of Kakolyadi Gana added with sugar and homey and made sweet should be given to drink; or the blood of deer, antelope, camel, rabbit, buffalo may be given to drink; he should take his meals along with milk, soup of grains or meat, added with more of fats IGhee or oil); complications secondary diseases may be treated appropriately (Su. Su. 14/36).

Samyaka Srava

- **Pravara Suddhi** : Instant relief in symptoms of the disease.

  लाधवं वेदना शान्ति व्याधेर्वेग: परिक्षय:।

  शुद्धं तदा विजानीयात् सम्यक् विसावित च तत्।। (Su.Su. 14/33)

Feeding of lightness of the body, mitigation of suffering, subsiding of severity of the disease and cheerfulness of mind - are the symptoms of proper Siravyadha.

- **Madhyama Suddhi** : The intelligent physician, even though may allow little quantity of vitiated Rakta remaining inside the body, but should not allow excess flow of blood; the remaining Dosas should be mitigated by conservative line of management.
- **Hina Suddhi :** The persons who are debilitated, who have great accumulation of Dosas or who are afflicted by fainting, Siravyadha should be done in the afternoon or on the next day or on the third day (Su. Sha. 8/14).

➢ **Defective Siravyadha :** There are 20 types of defects relating to an opened vein (Dushta - Vyadhana). They are as follows Durviddha, Atividdha, Kuncita, Piccita, Kuttita, Aprasruta, Atyudirna, Kunita, Vepita, Anuththita Viddha, Sastra Hata, Tiryaka Viddha, Avyadha, Vidhrta, Dhenuka, Punahpunahviddha And Sira-Snayu- I Asthi-Sandhi Marma Vidddha (Su. Sha.8/18 -19).

Management of Murchha during Siravyadha:

One of the major complications which leads up to sudden death is Murchha (unconsciousness) due to vasovegal shock.

If patient become unconscious while performing Siravyadha, the following points should be considered -

1. Immediate removal of the instrument from the wound.
2. Cold sponging.
3. Proper ventilation and aeration.
4. Consolation and assurance to the patient.
5. 'Further Siravyadha immediately after the management of unconsciousness.

6. If the patient becomes unconscious again then the patient should be called for Siravyadha after 2 - 3 days (A. S. Suo 36/19).

Pascat Karma

- **Massage and Dressing :** After completion of procedure when blood flow stops, Yantrana should be removed and instrument should be withdraw.

  Tight dressing should be applied on the wound and massage around the wound by oil preparation suitable for Abhyanga should be done. So that ecchymosis (Antaha Twaka Rakta Srava) can not occur.

  After Siravyadha, Vata gets aggravated by bathing (the area) with cold liquids etc. (methods of controlling bleeding) and gives rise to swelling and pricking pain, this should be treated by bathing the area with lukewarm Ghee (Su. Su. 14/45).

- **Pathya-Apathya :** By the depletion of tissue due to bleeding, the Agni (digestive enzymes) becomes weak and Vata becomes aggravated; hence the patient should be treated with food which are not very cold, which are light (easily digestible), unctuous, which promote blood formation and either slightly sour or devoid of sour (Su.Su. 14/37-38).

  After blood letting, the patient should avoid the exercise marital relations, cold breeze, one meal a day, day sleep, use of alkalis, pungent substances in food, grief, much conversation and indigestion till he attains good strength.

Follow Up : Patient should be advised for follow up for treatment according to Pravara, Madhyama or Hina Suddhi Laksanas.

GUIDELINES FOR PAIN MANAGEMENT

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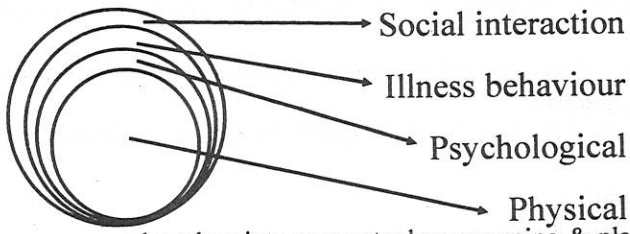
Every one of us has experienced pain, but it is very difficult to define this sensation satisfactorily. Pain is very important symptom which brings most of the patient towards us. So it is very essential to know about pain from bottom to top of the subject. As we know pain is not only a physical sensation but also, ultimately a psychological event. Today pain is the most common symptom which patients complain to their doctor.

Definition :

The international association for the study of pain (IASP) defines pain as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

This indicates that pain in not only physical sense. Pain has sensory, cognitive & motivational-affective dimensions & has been described as a biopsychosocial experience.



This phenomenon must be taken into account when assessing & planning a treatment strategy for the patient with pain.

Pain is a protective mechanism:

Pain occurs whenever any tissues are being damaged and it causes the individual to react to remove the pain stimulus. That is, this response is alarm for body that something biologically harmful is happening to the body. When we touch the burning stove-pain signal reaches brain instantaneously directs the hand move away from the stove. It provides crucial information about environment & helps to avoid injury.

Though pain is warning signal & primary protective in nature, it causes discomfort.

Brief physiology of pain :

1 Pain receptors - Free nerve endings.

2 Stimulus for receptor- i) mechanical - e.g. overstretch, pressure
ii) Thermal - e.g. hot, cold
iii) Chemical- e.g. strong acids & alkalis

3 Pain receptors are non-adopting in nature- It allows the pain to keep the person inform of a tissue damaging stimulus as longs possible.

4 Intensity of the pain is closely correlated with the 'rate of tissue damage' from cause other than heat- Pain resulting from heat is related with the 'rate at which damage to tissue is occurring & not with the total damage that has already accrued.

5 Signal transmitting nerve fibers :
Mylinated δ fibers - transmit signal for fast pain
Unmylinated C fires- transmit signal for slow fain.

Pain suppression (Analgesia) system in the brain & spinal cord:

Three major components:

1. Periaqueductal gray & periventricular area
2. Raphe magnus nucleus
3. Pain inhibitory complex

Fibers originating in this area send signals to the dorsal horn of the spinal cord to secrete serotonin at their endings. The serotonin causes local cord neuron to secrete enkephalin as well. The enkephalin is believed to cause both presynaptic and postsynaptic inhibition of incoming pain fibers. Thus, can block signal at the initial entry point.

Brain opiate system :

Activation of the analgesia system by nervous signal entering the periaqueductal gray and periventricular areas - Release of β-endorphin from hypothalamus and pituitary - Inactivation of pain pathway.

Qualities of pain :

1) **Fast pain - Felt within 0.1 sec after the pain stimulus.**

Nature : Sharp / pricking / Acute / electric e.g. Needle, knife by δ fibers - mylinated.

2) **Slow pain - Felt only after 1 sec. or more and then increases slowly over many seconds./ minutes.**

Nature : slowly burning pain/aching/throbbing/nauseous/chronic by C fibers - unmylinated.

Classification of pain :

According to etiology.

A) **Nociceptive pain :** Result from tissue damage causing continual nociceptor stimulation.

i) **Somatic pain :** Results from activation of nociceptors in cutaneous and deep tissues, such as bone. Typically it is well localized and describing as aching and throbbing. Usually, sensitive to opioids.

ii) **Visceral pain :** Often most of the viscera have sensory receptors for no other modalities of sensation besides pain. Visceral pain arises from internal organ, usually deep dull or dragging type of pain. Stimuli such as crushing, burning, ischemia, chemical damage, spasm of smooth muscle, overstretching, distension often erode the pain in soft organs.

Referred pain - visceral pain is often referred to cutaneous site distant from visceral lesion. When person feels pain in a part of the body which is fairly remote from the tissue causing pain, is called as referred pain. Knowledge of the different types of referred pain is important in clinical diagnosis because in many visceral ailments the only clinical sign is referred pain.

Mechanism : Branches of visceral pain fibers are shown to synapse in the spinal cord on the same second order neurons that receives pain signal from skin.

B. **Neuropathic pain :**

Neuropathic pain is caused by functional abnormality of the peripheral and/or central nervous system. In such condition patient complaints of unpleasant abnormal sensation. There may be marked allodynia i.e. normally non-painful stimulus, such as light touch, may enhances pain. Pain may be shooting or burning in nature. Neuropathic pain may develop

immediately after nerve injury or after a variable period. It is often persistent and relatively resistant to opioids. There is a tendency for a favorable response to centrally modulating medications, such as anti-convulsants, and tricyclic antidepressant.

Sympathetically maintained pain : Pain that is maintained by sympathetic efferent innervations or by circulating catecholamines is termed as SMP. Sympathetic nerve blocks provide temporary reduction in pain in some cases.

The condition previously termed reflex sympathetic dystrophy has now been renamed 'complex regional pain syndrome type-I, as not all patients with this clinical diagnosis have relief of pain following sympathetic nerve block.

Complex regional pain syndrome (CRPS) type-I :

Cause - Develops in a limb after mild soft tissue trauma or a fracture.

Nature - Burning pain, allodynia (abnormal sensitivity of the skin) associated with sweating, swelling, atrophy of the skin, muscle, nails.

Localized osteoporosis

Movement of the limb-restricted - pain and contractures may result.

Treatment : Adequate analgesia
Encourage active physiotherapy
Improvement of function

Complex regional pain syndrome (CRPS) Type-II :

Features as CRPS-I, but which occurs after partial injury of a nerve or one of its branches.

C) Somatoform pain disorder :

This is currently accepted psychiatric diagnosis:

Such diagnosis should be made by or in conjunction with a psychiatrist. Chronic pain is usually the cause and not the result of psychiatric symptoms.

Guidelines of pain management :

A. History :

Many patients suffering from complaint of pain have depression, anxiety and anger. In severe type of pain patient wants only quick relief, nothing else. Such patients are more satisfied when they are believe that they were given a chance to 'tell their story' to the physician. This also helps in effective doctor - patient relationship.

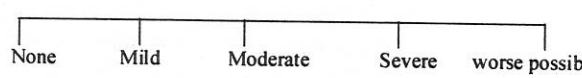
i) Complete pain history :

a) Location
b) Onset - quick / slow
c) Duration - short / prolong
d) Characteristic - Throbbing / burning / shooting / pricking
e) Intensity - mild / moderate / severe

Assessment Parameters :

1. Numeric

2. Categorical



f) Distribution / Radiation: e.g. sciatica, renal stone.
g) Exacerbating and relieving factors
h) Associated symptoms
i) Response to previous therapy / current medication
j) Patients own ideas as to causation.

ii) Complete medical history :

Past illness/ surgery / injury / Treatment

iii) H/o - Family / Occupational / Social / Emotional / Psychological

Many patients, especially those with malignancy, have more than one site of pain and separate histories should be taken for each complaint as their etiology may differ. Particular care and skill are needed when taking a pain history from children and the elderly.

B) Physical examination :

Physical examination should be start with entry of the patient by the door. e.g. gait of the patient.

Physical examination is necessary not only to find out the cause but also the effect or the pain, such as physical deconditioning.

Purpose of physical examination is to define the correlation both the patients complains and the anatomic possibilities.

Physical examine must include that all observable behaviors that helps to clinician to formulate an opinion about the intensity and the severity of patients complaints.

C) Psychosocial evaluation : .

It includes evaluation of psychological symptoms. In this evaluation it is beneficial to take help of patient's family member and/or friends.

Point to be keep in mind are (level of) anxiety, anger, depression, economical depression and expectation of the patient, all these may present in patient with chronic pain. Patient with chr. pain sometimes lose their jobs, financial security and social status. Therefore psychological evaluation plays important role here.

D) Diagnostic evaluation :

Diagnostic tools :

i) Complete pain history, medical history, physical examination, psychosocial evaluation.
ii) Imaging modalities - Like USG, MRI, X-ray
iii) Laboratory studies - Like RA factor.
iv) Diagnostic neural blockage
v) Pharmacodiagnosis

Impression — Probable etiology
Probable pathophysiology

E. Treatment plan :

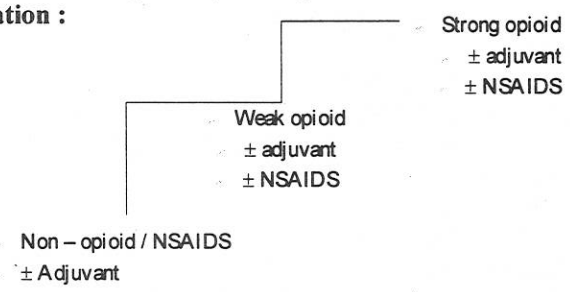
I) Counseling - There should be open mind discussion between the patient and doctor about what type of treatment we are going to plan, which techniques we are going to use, which is most beneficial for the patient therapeutically and economically. Physician should explain the probable duration of such treatment. Always keep in mind about psychological status of patient

suffering from pain. It is very beneficial to keep our hand over shoulder of the patient, rather than our stetho over his chest. Most often ever pain is treatable only if a patient talks about it accurately and candidly with his doctor.

Intensity of pain depends not only upon the nature of pain but also upon one's expectation about availability of relief measures.

II) **Method of management of pain** - Pain is a complex phenomenon and often multifactorial in etiology. Several methods of treatment are mentioned in ayurveda and modern medicine. These methods may be used in same patient, either concomitantly or sequentially.

A) **Medication :**



First step of this 'analgesic ladder' is a non-opioid. If this is inadequate, a weak opioid such as codein can be added.

The third step is substitution of the weak opioid by a strong opioid

It means inadequate pain control at one level requires progression of a drug on the next level. Adjuvant analgesics, such as anticonvulsants or tricycles antidepressant may be used at any stage.

Using these strategies, pain can be controlled successfully in about 90% of patient.

i.) Non-steroidal anti-inflammatory drugs (NSAIDS) :

Pharmacodynamics : NSAIDs interfere with production of prostaglandins & prostacyclins by inhibiting the enzyme cyclo-oxygenase (COX-1, COX-2, inhibitor)

Action - Anti-inflammatory & analgesic

Used - In mild to moderate pain, particularly of somatic origin.

Effective - Painful bone metastases, dysmenorrhoea, arthritis, musculoskeletal pain

Pharmacokinetics - Route - Oral, I.M., I.V., Rectal, Topical.

Drugs :

I. Nonselective COX inhibitor - (Causes peptic ulcer)

a) Salicylates - Aspirin 75 - 100 mg/kg/day. Rheumatoid arthritis.

b) Pyrazolone derivatives - Phenylbutazone . Acute gout, arthritis. 100-200mg BD

c) Indole derivatives - Indomethacin 20-50 mg BD. Spondylitis.

d) Propionic acid derivatives - Ibuprofen 400-800 mg TDS. 20-30 mg/kg/day, 10% gel.

e) Anthranilic acid derivatives - Mephenamic acid ,10% gel.

f) Aryl-acetic acid derivatives - Diclofenac - 75 - 150 mg/day in divided doses - 75 mg I.M./I.V.I. 1-2 mg/kg/day - Rectal. 1-3% gel topical
Aceclofenac - 20mg/day

g) Oxicam derivatives - Piroxicam - 40mg/day. Orally; 05% gel topically.
Tenoxicam - 20mg/day orally/I.M/I.V.

II. Preferential COX-2 inhibitor :
a) Nimesulide - 200 mg BD Oral / Rectal, 1% gel.
b) Meloxicam
c) Nabumetone

III. Selective COX-2 inhibitor (Low ulcerogenic potential)
a) Rofecoxib - 10mg/daily orally
b) Valdecoxib
c) Parecoxib - 40 mg I.M./I.V.
d) Celecoxib - 100-200mg B.D

Major side effects - Active peptic ulceration, Renal and hepatic impairment, C/I - 3rd trimester of pregnancy, lactation.

ii) Opioid Analgesics :

Drugs : Acts on μ,κ,δ,σ & ε receptors.

I . Natural opium alkaloid :
Morphine - 5-20mg/hr. orally ; 0.1-0.2 mg/kg
10mg at the rate of 2mg/min I.V.
10mg/hr. I.M/S.C.
10-30 mg/4 hr. Rectal.
5mg/ - epidural (max 10mg/24hr) (1/10th of total 24 hr dose)
0.2 -1 mg - Intrathecal.
Codeine - 30 - 60 mg oral

II. Semisynthetic opioids :
Diacetylmorphine (Heroin)
Pholcodeine

III. Synthetic opioids :
Pethidine (meperidine)- 50-100 mg oral/im//S.C., 10-15 mg I.V.
Fentanyl- 2-4 μg/kg I.V., 25-15 μg/hr transdermal patches.
Methadone-2.5-10mg oral/im.NMDAantagonist., Dextropropoxyphene- 60-120 mg oral.
Tramadol- 50-100 mg oral/im/slow i.v.i. (1-2 mg/kg)
Ethohepazine- 75-150 mg oral

Major side effects- Respiratory depression, paralytic ileus, acute liver diseases, tolerance, addiction, constipation, drowsiness.

Use of strong opioids in non-malignant pain is controversial. When the required daily dose has been established, it is usual to convert to sustained release morphine tablets. In addition, immediate release morphine tablets should be prescribed for break through pain, (1/6th of total daily morphine requirement).

iii) Adjuvant analgesics :

These are the drugs that have primarily indicated for conditions other than pain but are analgesic in some painful conditions.

a) **Oral corticosteroids :**

Mechanism - unknown

↓ Inflammatory mediators, especially prostaglandins

↓ edema - ↓ pain by ↓ pressure.

b) **Anticonvulsants :**

- Used in of neuropathic pain.
- Stabilizing effect on neuronal cell membranes, possibly by inactivation of sodium channels.
- Also facilitate GABA mediated inhibition & decrease activation of NMDA receptor.
- E.g. Gabapentine,Carbamazepine, Phenytoin.
- Serious haematological complication may occur.
- S/E - sedation & ataxia

c) **Tricyclic antidepressant :**

Reduces reuptake of the amine neurotransmitters norepinephrine & 5-HT into presynaptic terminals, increasing conc. & duration of action of these substances.- enhancing activity in the descending inhibitory pain pathway.

e.g. Amitriptyline - 10-25 mg Hs.

Imipramine , Prothiaden.

S/E - Constipation, sedation (Beneficial), dry mouth

d) **Systemic local anaesthetic infusion** : Diagnostic & Therapeutic in neuropathic pain.

Lidocain 5 mg/kg - I.V.- Diabetic peripheral neuropathy

B) Neural blockade in pain management :

Nerve blocks have been performed for many years in the management of pain. An injection of local anaesthetic (sometimes combined with steroid) or a neurolytic agent around a peripheral or sensory nerve, a sympathetic plexus or a trigger point. It requires much experience & deep knowledge of anatomy and an understanding of pain syndrome. The use of radiological control & contrast media is strongly advocated to confirm accurate needle placement.

Examples:

Trigger point injection -	myofascial pain, scar pain.
Trigeminal nerve block -	Trigeminal neuralgia.
Coeliac plexus block -	Intratabdominal malignancy (using 50% alcohol)
Superior hypogastric plexus block -	Pelvic pain (using phenol)
Lumbar sympathectomy -	Inoperable ischaemic leg pain (use of phenol)

c) Neurolytic Techniques:

Neural destruction can be produced with alcohol, phenol, heat or cold use of these techniques has diminished in the last two decades. Careful thought with regard to the potential

benefits & risk of the procedure, appropriate patient selection & fully informed consent is essential before performing a neurolytic procedure.

i) Chemical Neurolysis : phenol, ethyl alcohol.

Phenol- Coagulates protein & destroy all types of nerves

Alcohol- Choice for celiac plexus block.

ii) Radiofrequency Lesion :

A destructive heat lesion can be produced using a radiofrequency current. Insulated needle with a small exposed tip can be used. A high-frequency alternating current flow though it - damage to nerve fibres at 45^0C. e.g. Radiofrequency lesion of trigeminal N. - Rx of trigeminal neuralgia.

iii) Cryo Therapy: Lesion by a cold using cryoprobe

Agent - N_2O temperature 75^0C

D) Stimulation - induced analgesia :

i) Transcutaneous electrical nerve stimulation (TENS) :

Since Melzack and wall proposed the gate control theory in 1965. They postulated that large - diameter primary afferent exert a specific inhibitory effect on dorsal horn nociceptive neurons and that stimulation of these fibres would shows significance in pain.

A small battery - Powered unit is used to apply the electrical stimulus to the skin via electrode. These are placed over the painful area. Stimulation is applied at an intensity that the patient finds comfortable.

Adverse effect - minimal but allergy to the electrode or gel being the commonest problems.

Use
- Variety of musculoskeletal and neuropathic pain specially in chronic pain.
- Useful in refractory angina.
- Acute post operative pain
- Analgesia for the 1st stage of labour

ii) Spinal cord stimulation (SCS) :

Reversible non-ablative method for the management of pain. - especially that of neuropathic pain when pharmacotherapy has failed. Electrical stimulation may be applied to the spinal cord via electrodes implanted surgically or positioned percutaneously in the epidural space under x-ray control. First there is trial stimulation. If patient shows significant improvement in pain relief - such patient can be considered for permanent implantation of a battery driven stimulus generator. The patient uses a magnet to activate the stimulator. Patients obtain good relief initially but pain returns after some months

Use
- Promote local blood flow
- For ischaemic ulcer healing in patient with peripheral vascular diseases.
- Recently implanted for angina : But same mortality rate as general population of angina.

iii) Acupuncture:

The Chinese have known for 4000 years that inserting needle at specific points in the body produces analgesia.

Traditionally, Acupuncture points are stimulated by the insertion of fine needles which are then rotated manually or stimulated heat (maxibustion) or electrically.

It is postulated that there exists both a segmental and a nonsegmental mechanism.

Acupuncture has become an accepted treatment in many pain management clinics, especially for musculoskeletal pain.

Single - Needle acupuncture to the P6 point on the wrist is antiemetic in post-op nausea and vomiting, morning sickness and in patient receiving cytotoxic drugs.

E) Psychological Techniques :

Pain is not merely a sensation of tissue damage, but a complex interaction of biochemical, behavioural, cognitive and emotional factors. Chr. Pain patients become anxious, depressed, distressed, functionally impaired and lose self-esteem. These important aspect should be addressed in the pain management clinic.

Cognitive and behavioural techniques can be used to reduce the helplessness and hopelessness of the pain patient and to increase the level of functioning and emotional well-being in spite of the pain.

Sleep is the safest and work is the best analgesia, moderate regular exercise - a-30 minute daily greatly reduces one's susceptibility to pain.

APPEAL

All the life members who had already paid Rs. 500.00 as Life Membership fee are requested to send a DD of Rs. 500.00 in favour of A.A.I.M. payable at Varanasi for purchase of Land of office of Association (C.C.) at Varanasi.

The members who will donate Rs. 1001.00 or more will be presented a certificate and their name will be published in the Journal with their Photographs.

Due to increase in Postal Charges the Journal will be send only to those members who will send Rs. 100.00 as Postal Charges by M.O./ D.D. in favour of *Sangyaharan Shodh*.

Concept of Painless Labour in Ayurved

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Abstract – Ayurved the great science which is enriched with knowledge of day to day mode of life with respect to descriptions of many diseases and their treatment. Treatment may be medicinal psychological, spiritual or even surgical. Counseling/assurance is also included in the ayurved system of treatment. Labour i.e. "Prasava" is described in details in ayurved classics. One and half decade before the term painless labour re-emerged suddenly. Many fharmacalogical analgesic mainly opioid derivatives inhalation analgesic /anesthetics and regional analgesia are used for this purpose but all these got more disadvantages and have untowards effect on both the mother and neonate.

Ayurved it self as "Sukh Prasav". The term sukh prasav is not confined only to easy or comfortable labour, it is polysemous word which denotes successful obstetric outcome. This depends on chains of careful supervision which start with the onset of pregnancy and end in puerperal period.

Key Words- Sukh-prasava, Labour, Analgesia, Anaesthesia, Psychological , Counseling, Assurance, Pregnancy, Pranayam, Yogasana, Garbhini-paricharya, Kati-shoola etc.

INTRODUCTION: We can not conceive of labour without pain. Labour is a phenomenon where pain & pleasure is so closely related to each other that the woman completely forgetting her pain soon after her delivery. Enlightened physician have been concerned with alleviating labour pain, however the attitude towards providing pain relief has been conflicting.

In modern practice of obstetrics and gynecology painless labour is meant for labour i.e. expulsion of baby but concept of ayurved is wide and clear. To get deliver easily a healthy progeny without facing much pain or other complication proceeding start from day of conception.

Today's in metro culture life style and food habits have been change, girls become more career oriented, willing for higher education results in late marriages, late conception more over environmental pollution, luxurious life style, adverse condition of profession etc. are causes of many obstetric related problem. These all may results in high risk pregnancy like elderly primy gravida, hyper tension (PIH) etc. less pain bearing capacity of girls in coordination contraction cervical dystrosia etc. may result in caesarean section. Therefore to follow "dincharya" "ritucharya" "masanumasik" "garbhini paricharya" and "sutika paricharya" to get a healthy baby through an easy and comfortable delivery is necessary.

OBJECT – Pain causes increase in catecholamine, which in turn reflux tachycardia, hypertension, increase blood sugar, tachypnea results in hypoxia which decrease placental perfusion and so that nutrition to the fetus. Painless labour provide benefit to the mother, fetus and the obstetrician also.

For the mother: - Its provide relief from pain, control alteration in circulation, ventilation and undue muscular efforts. It ensures a better patient cooperation.

To the fetus: - Short and less traumatic labour protection against hypoxia.

To the Obstetrician: - It provides better control in events emerging during the course of labour reduces pressure from the patient and the relative to intervene.

Pain relief during labour in modern systems of medicine:
Now a day women of good socio-economics status not want to bear labour pain so prefer painless delivery.
Criteria for selection of selection of cases: - Women having hypertension, cardiac problem, backache, tuberculosis or any other infection of veritble column should be avoided and patient should fulfill the condition for normal delivery.
There are many ways to get analgesia during labour pain:
With the help of analgesic and sedative medicine mainly like tramodol, diazepam, pentazocin and ketamine (S.N. Daftrai et al, 2003)
ADVANTAGE: It is less expensive and an assistance of anesthetist not needed.
DISADVANTAGE: Respiratory depression to the neonates may occur, baby refuse to breath spontaneously at birth they needed ventilatory support for a few minutes with bag and mask before they began to cry satisfactory so a neonatalogist will always in attendance.
EPIDURAL ANEASTHESIA: It is type of regional analgesia, emerging rapidly now a day for safe and painless delivery.
ADVANTAGE: It provides excellent pain relief unduly jioparadizing the labour outcome. Can be used form first stage of labour.
DISADVANTAGE: Service of anesthetist must be needed.
PSYCHO PROFYLAXIS:
In developed country pregnant woman educate about pregnancy process of labour, and her conduct during delivery to cope up with fear of labour pain.
She assured about that her active cooperation will make the labour easy and painless.
To overcome the conditioned reflects that all labour are painful new reflexes are taught. That contraction (during labour pain) is the indication to start breathing exercise.
Breathing exercise is taught in last trimester. In the first stage slow breathing between contraction and quick shallow breathing during contraction. In the second long inspiration is taught that involves fixing the diaphragm chest and abdominal muscles contracts and help in expulsion of fetus.
Neuro muscular control also taught woman can contract abdominal muscles and relax pelvic muscle at the same time during bearing down efforts.
Pain relief during labour in Ayurved : The prophylactic value of antenatal supervision is show much tested and recognized that it is needed to stress its importance. It should be born in mind that successful obstetric outcome depends on chain of careful supervision which start in pregnancy and end in puerperal period, in adequacy of one can'tcompensated by the other. An authority on Ayurveda diagnosed the pregnancyon can on the day woman conceived (sadyo grahita garbh C.S.Sh.2/23; S.S.Sh.3/13) and proceeding for painless management of labour start from that very day.

Care during antenatal

The monthly regime mentioned under the heading "Masanumasik Paricharya" in the texts of ayurveda explains clearly the antenatal care to be given to a pregnant lady. Describing the benefits of this dietetic regimen Charak and Vagbhatta said that garbh dharini (fetal membranes or Vaginal canal) kuksi (abdomen) sacral region; flanks and back become soft., bowels are cleared woman gains strength and delivers easily (C.S.Sh.8/32; A.S.Sh.3/13). Sushruta clarified that by this, the fetus attains good growth; Vayu moves in the right direction, woman become unctuous strong and delivers the child easily without complication

(S.S.Sh. 10/4). Diet mainly include liquid, sweet, cold preparation, few drugs like gokshur, prishna parni. These all help woman to remain healthy, increase in weight, prevent salt and water, retention, backache, abdominal pain, constipation, less the pain during labour and after delivery.

Pregnant woman should wear chain of "trivrit" inpelvic region. It helps in "such prasav" by its "prabhav" (K.S. Khi. 101/181.)

Pregnant should wear clean clothes as well as surrounding (S.S. Sh. 10/3) to maintain the hygiene to prevent infectious diseases. Pregnant woman should do worship. remain joyous, and listening saints (K.S.Sh. 5/14). All these help to improve threshold of pain bearing capacity.

"Simantonayan Sanskar" is described during 5th month for the purpose to inform near and dear about her pregnancy through this she get moral support and caring environment.

YOGA/EXCERISE: Pregnant woman should do simple exercise like walking, tadasan, uttanpad aasan, Sukhasan to improve circulation and for relaxation of pelvic muscle, so labour is less painful.

All these steps of "pranayam" except Kapalbhati should be done. It is a breathing exercise and improves circulation, oxygenation and hence placental perfusion.

Vigorous exercises or any exercise which cause pressure on abdomen like mandukasan, paschimotpad aasan are contraindicated. Mayurasan is contraindicated to every woman.

Co-operation of husbands and relatives make the process of labour less painfull.

Daily bathing with herbs of jivaniyagan or vatshamak leaves prevent pregnant woman with minor infection.

Vasti and Pichu: - In thousand and thousand years old ayurvedic classic labour was described with great detail. Expulsion of foetus mainly depends upon proper functions of apana Vayu, because of its function it is termed as "prasuti maruta". During pregnancy chances of aggravation of apana vayu is more due to obstruction to srotasas of pakwashaya by gravid uterus. Vitiated apana vayu influences the functional aspects of labour.

In eight month special medicated asthapan vasti is prescribed (A.S.Sh. 3/11).

In 9th month of anuvasan vasti and pichu (medicated tampon) are advised (C.S.Sh. 8/32).

Vasti and pichu normalize the apana vayu. Due to the better function of apana Vayu good and coordinated myometrial contraction associated with good cervical dilatiation occure. Results in shorter duration of labour. So woman in labour bear less pain as schedule time shortened and exert less.

Pain threshold of woman also increases because of normalization of apana Vayu. Increased pain threshold helps in better co-operation buy the woman resulting into good bearing down efforts and less feeling of after pains.

Vasti and pichu may be acting by influencing the autonomic nervous system, however influences an prostaglandin can't be ruled out.

The group of women receiving vasti and pichu has shorter duration of labour in comparison to a treatment groups.

Sutikagara:- The woman is being kept in sutika gara from the ninth month onwards. This is mainly to prevent the contact of infections and prepare the woman psychologically to withstand labour pains.

To make labour more comfortable, encouragement and assurance are given to keep up the moral and to avail maximum co-operation during voluntary expulsion of the foetus. Multiparous ; good natured; affectionate and enduring ladies surround the expectant mother and incourage her. So that she delivers comfortably.

Rakshogna (antiseptic) drug as vaca, Kustha, Ksaumka, Lingu, sarsapa atasi, lasuna, kanakanika, gugglu etc, should be hanged wrapped in a pocket in the upper portion of the door frame. A pestle should be placed in oblique position over door-sill. Small packets of rashogna drugs should be tied in the neck of puerperal woman and child, over thali (cooking pot) over pot filled with water, bed and both the panels of door. Fire should lit daily with the woods of kanak kantaka or tinduka inside the sutikagara.

Entire raksha karma is aimed at offering protection from infective disorder to the mother and child. The various drugs rakshoghna (antiseptic) drugs as vaea, kustha, ksaumka, hingu, sarsapa, atasi, lasuna, kana kanika, gugglu etc used for the purpose either help in making the invironment free from micro organism or to reduce their virulence.

The woman having qualities to take care of the new born and wellwisher, kind natured should be present to take care of mother and child. The labour ward should be full of gifts, auspicious recitation, blessings, and praises, playing musical instruments, clean and dainty food and drinkables along with loyally denoted and delighted persons. For the good fortune and welfare of the mother and the child. The Brahmin possessing knowledge of athravaved should perform shanti hom (pacifying oblation to avert or remove evils) at morning and evening times (C.S.Sh.8/33 to 8/35; S.S.Sh 10/5). Sympathetic loving encouraging behavior of care takers homely atmosphere is best analgesic.

First stage of Labour :- Asanna prasava or upasthita prasava advised to do auspicious deeds to divert her attention towards pain.

Gentle massage with luke warm oil on prashva prisht, kati, sakthipradesh to prevent vata prakop.

Repeated yawning (for purpose of improve oxygenation and walking for a while are advised (C.S.Sh. 8/37; S.S.Sh.10/8).

Satvavjay continuous presence, assurance, counseling about normal labour by care takers leads to "Sukh Prasav" (for diversion mind from pain) same role played by psycoprophylaxis.

Second stage of labour :- During "parivartan" or "awaak" of garbh (expulsive phase of labour) aavi become intensive and progressive. Care taker's assured her about normalcy of labour and say during contraction of uterus repeatedly–delivered– delivered; weldone-weldone; male child born; male child born. Like sentences. By this phenomena woman going to deliver more enthusiastic encouraged and get strength to bear down (C.S.Sh. 8/40).

Care taker advised her not to bear down presence of aavi, bear down slowly in expulsive phase i.e. fetus release bond of hriday decent towards pelvise.

During propulsive phase when fetus about to deliver bearing down efforts should be very strong (S.S.Sh. 10/9).

Mantra (Daivavyapashray Chikitsa) :- One of the care taker should speak mantras in parturient ear (S.S.Sh. 10/9; A.S.Sh. 3/258) this procedure help and get rid of fear (fear may be of unknown cause; fear of delivering dead fetus of congenitally malformed baby: and fear of pain obviously) change mode of thinking and divert it.

Abhyang and Prasaran: - Care taker should do abhyang of yoni with ashwagandhadi tail and do prasaran (Ironing) also (As.Sh. 3/24)

Going through all the steps of prasav like avasransan (descent) (C.S.Sh. 8/39), sankoch (flexion) (C.S.Sh.6/24) prasaran (internal rotation) (C.S.Sh.8/41) pratyavasthapana (restitution) (A.S.Sh2/35) and bahir vartan (external rotation). (K.S.Khi 11/6); baby delivered safely, easily without any complication, if all above instruction right from conception till delivery fallowed properly.

By this ayurvedic management effective analgesia is maintained through out the period of labour along with feto maternal well being. Duration of labour is cherished with pleasure and child birth becomes a joyous event for the mother.

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CLASSICAL ANALYSIS OF DASMOOLA AND ITS CLASSICAL PREPARATION

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Introduction:

There are some controversy about constituents of Dasmool. The term Dasmoola has not mentioned in Vedic literature. The Sushruta has described that the two groups - Mahat (Brhat) and Kaniya (Laghu) Panchmula are jointly called as Dasmoola.

Components of Dasmoola in Samhita

A. Charaka Samhita:

Charaka has not mentioned Dasamoola in Charak Samhita, though he has used the word "Dasamoola" in different formulation while describing the treatment of different diseases. But he has not clearly mentioned the ten drugs which constitute Dasamoola. He has mentioned that Patala, Agnimantha, Syonaka, Bilva, Kasmarya, Kantakari, Brahati, Salparni, Prasniparni and Goksura, are the constituents of Svayathuhara mahakasaya. Again in Rasayanadhyaya prathama pada of chikitsa sthana describing "Brahmarasayana". Charaka has mentioned the drugs of Dasamoola under the heading of "Panchapanchakmula". But he has not termed them as laghu & Brhat panchamula or dasamula. The drugs of laghu panchamula are mentioned here under the group named as "Vidarigandhadi". In Vastisisddhi, Adhyaya of Siddhi Sthana. Charaka has mentioned that, Vasti consisting of Bilva, Agnimantha, Syonaka, Gambhari and Patala. Basti of salaparni, Prasniparni, Brhati Kantakari and Vardhamana (Eranda) are used in diseases of Vata, along with catuhsneha. Here charaka has not mentioned these drugs as Brhat and Laghu Panchamula & Goksura along with other drugs of laghu panchamula.

B. Sushruta Samhita:

Sushruta Samhita is the first treatise in which Dasamoola is clearly mentioned. However, there is some controversy in its components. Sushruta has described that the two groups - Mahat (Brahat) and Kaniya (Laghu) panchamula jointly called "Dasamoola". The constitutents of Kaniya (Laghu) Panchamula are Trikantaka (Goksura), Brahatidvaya (Brhati and Kantakari, prasniparni, and Vidarigandha (salparni). The Mahat panchamula is constituted from Bilva, Agnimantha Tintuka (Syonaka), Patala and Kasamari (Gambhari), there is no any controversy regarding component of Mahat panchamula. The matter of controversy is in the components of Kaniya Panchamula. In some editions of Sushruta Samhita, Eranda is mentioned in place of Goksura as one of the ingredients of Laghu Panchamula.

Acharya Yadavaji while editing Sushruta Samhita has mentioned in the foot note that Eranda is substituted in the place of Goksura as one of the components Kaniya (Laghu) pancamool in a manuscript Susruta Samhita. This old manuscript of Sushruta Samhita was found by Acharya Yadavji and is written on Tada patra.

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C. Astanga Samgraha & Astanga Hridaya:

The components of Mahat (Brahat) and Hrasva (Laghu) Panchamoola are described but it is not said that both are jointly called as Dasamoola. Thus components of Dasamoola are not described in both the books though they have mentioned the term Dasamoola in different formulations.

D. Kasyapa Samhita:

In Kasyapa Samhita, which seems to be incomplete, Dasamoola is mentioned in many formulation but its components are not described. However, in one verse kasyapa has mentioned Eranda as one of the component of Khuddaka (Laghu) Panchamoola.

View of Commentators

Cakrapani Dutta (11th A.D.)

Cakrapani Datta in his "Bhanumati" commentary of Susruta Samhita has clearly described that Sushruta accepts "Eranda" whereas Caraka accepts Goksura in the place of Eranda as one of the components of Panchmula (Laghu pancamula).

Dalhana (12th Century A.D.)

Dalhana in his "Nibandha Samgraha" commentary of Susruta Samhita has accepted the view of Susruta regarding the component of Dasamoola. He has accepted that Laghu Pancamula (Trikantaka, Brhatidvaya, Prthakparni and Vidarigandha) and Mahat Pancamula (Bilva, Agnimantha, Syonaka, Patala and Gambhari) constitute the Dasmoola gana. But further he says that some people consider, Eranda in the place of Goksura as one of components of Kaniya pancamula.

Hemadri (13th-14th Century A.D.)

Hemadri in his "Ayurveda Rasayana" commentary of Astanga Hrdaya Samhita has also clearly mentioned that Susruta includes Salaparni, Prsniparni, Brhati, Kantakari and Eranda under Laghu Pancamula. He has accepted Bilva, Agnimantha, Syonaka, Patala and Gambhari as the components of Brhat pancamula.

Sivadasa Sen (15th Century A.D.)

Sivadasa Sen in his "Tatva-Chandrika" commentary of Cakradatta has very clearly described that Susruta accepts Eranda in place of Goksura and Caraka accepts Goksura in place of Eranda as one of the components of Laghu pancamoola. Therefore, according to Sivadasa Sen, Erandamula should be used as one of the components of Laghu pancamula in a preparation suggested by Susruta and Goksura should be used in the preparation suggested by Caraka.

Summary:

Charaka has not mentioned the components of Dasamoola. Vagbhatta, Kasyapa and Bhela have also not mentioned the components of Dasamoola. Sushruta has mentioned that Mahat (Brahat) and Kaniya (Laghu) panhcamula constitute the Dasamula Gana out of which Mahat panchamula is constituted by Bilva, Agnimantha, Syonaka, Patala, and Gambhari. Two type of description are seen in different editions of Susruta Samhita regarding the components of laghu pancamula. In some editions of Sushruta Samhita - Salaparni, Prsniparni, Brahati, Kantakari and Goksura are mentioned. Whereas in other texts of Sushruta Samhita Eranda is substituted in place of Goksura as one of the components of Dasamoola. Kasyapa also mentioned Erand as one of the component of laghu panchamula. Some other authentic evidences also prove that Sushruta was in favour of accepting Eranda in the place of Goksura.

Some classical preparations of Dashmoola :

दशमूलक्वाथ – सन्निपातज ज्वर चिकित्सा में योग चन्द्रिका (३/३२–३३)
दशमूल कषाय (दशमूलकाढा +पीप्पलीचूर्ण)– अत्यन्त निद्रा, पार्श्वशूल, कफवात ज्वर में (चक्रदत्त– ज्वरचिकित्सा)
दशमूलकी कषाय (दशमूलकढा +सोंठचूर्ण)– ज्वर, अतिसार तथा शोथ सहित ग्रहणी रोग में (चक्रदत्त– ज्वरचिकित्सा)
दशमूलादि क्वाथ (दशमूल+रास्ना+पोहकर मूल+देवदारू+सोठ)– पार्श्वटरल, ज्वर, श्वास, पीनस आप रोगों में (चक्रदत्त– राजयक्ष्मा चिकित्सा)
दशमूल क्वाथ (दशमूल से सिद्धक्याऽताद्रत)– वातरक्त चिकित्सा (चक्रदत्त)
दशमूलहरितकी (कंसहरित चरक से)– शोधचिकित्सा– चक्रदत्त
दशमूलारिष्ट (शां०सं०म० १०/८७–९२– धातु, क्षय, छर्दि, ग्रहणी, गुल्म, कास, दौर्बल्य, कामला)

It is pustijanana, gives pregnence to the childless and Sukrabala pradam.

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शालपर्णी पृश्निपर्णी गोक्षुरका इति दशेमानिश्वयथुहराणि भवति।
(च०सं०सू० ७/३९)

२. बिल्वाग्निमंथटिण्टुकपाटला: काश्मर्यश्चेति महत्।।
(सु०सं०सू० ३८/६९)

३. तत्र त्रिकण्टकबृहती द्वयपृथक्पर्ण्यो विदारिगंधा चेति कनीय:।
(सु०सं०स० ३८/६७)

४. तत्र एरण्ड बृहत्योपृथम्पर्णी विदारिगंधे चेति कनीयान्।
(सु०सं०स० ३८/६७)

संपादक श्री यादव जी विक्रम जी आचार्य एवं पं० नंद किशोर शर्मा भिषगाचपि प्रकाशक पं० श्यामसुन्दर शर्मा, रजिस्ट्रार, अगारा विश्वविद्यालय एवं सचिव स्वामी लक्ष्मीरामट्रस्ट, १९३९

५. चरके गोक्षुरकं च एरण्डस्थाने पठ्यते न सुश्रुतप्रयोगेषु, एवं पंचमूली प्रयोगे एरण्डो गृहीतन्य:। गुणतो न्येष्ठतमो वर्गप्रथम पाठात्।
चक्रपाणि दत्त, सुश्रुत संहिता, सूत्रस्थान "भानुमती व्याख्या" ३८/६७

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७. सुश्रुतस्तु गोक्षुरस्थाने एरण्ड पठति।
हेमाद्रि, अष्टांगहृदय सू०स्थान ६/१७७
"आयुर्वेद रसायन टीका"

Late Prof. L.M. Singh, Memorial Oration

Delivered by: Prof. V.K. Shukla, Medical Superintendent, S.S.H., I.M.S., B.H.U., Varanasi

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EMPLOYMENT

- ☐ Lecturer : Ayurvedic College, BHU – 1957
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- ☐ Professor : IMS, BHU – 1977
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- ☐ Dean : Faculty of Ayurveda, BHU – 1987 – 89.
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FOREIGN EXPERIENCES

- ☐ Research Fellow in Surgery, Haenemann Medical College, Philadelphia, USA 1962-64.
- ☐ Postgraduate Research Surgeon, University of California, San Francisco, USA.
- ☐ Senior Lecturer in Surgery : Monash University, Melbourne, Australia – 1971.
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- ☐ Lectures in Austria, Switzerland and Germany : 1991, 1992, 1994, 1995, 1997 and 1998.

RESEARCH AND OTHER EXPERIENCES

- ☐ Supervised 30 Postgraduate MD and Ph.D. students in Ayurveda.
- ☐ Fulbright New Century Scholar – 2001, USA.

MEMBERS OF ACADEMIC BODIES

- ☐ Faculty of Indian Medicine, BHU.
- ☐ Central Council of Indian Medicine, Delhi.
- ☐ Scientific Advisory Committee, Gujarat Ayurved University, Jamnagar
- ☐ Expert : State Public Service Commission, UP
- ☐ Expert member of various committees on Ayurveda in Nepal
- ☐ Faculty Board, Institute of Medicine, Tribhuvan University, Kathmandu – 1978-1981.

OTHER ACTIVITIES

- ☐ Member Secretary, Ayurveda Development Board, Ministry of Health, Nepal 1994.
- ☐ Chairman, Himalayan Ayurveda research Institute, 1994.
- ☐ Convenor, Ayurveda Education Committee, Mahendra Sanskrit Uni. 1997.
- ☐ Co-ordinator : GTZ project on Survey of Traditional Medical Practice and Medicinal Plants in Gorkha District 1997.

HONOURS AND AWARDS

- ☐ Gold Medal for standing First in AMS examination.

- Sushruta Oration, Annual Conference, National Integrated Medical Association, 1989.
- Fellowship, National Academy of Ayurveda, New Delhi 1994.
- Prof. K.N. Udupa Oration, Sushruta Association, 1997.

PUBLICATIONS

- More than 50 research articles in National and International Journals.
- Books Edited :
  - Methods of Surgical Research
  - Diagnostic Considerations in Ancient India
  - Operative Considerations in Ancient India

ORATION LECTURER

EVOLUTION OF LAPAROSCOPIC SURGERY

INTRODUCTION

- Minimally invasive surgery (MIS) has experienced an explosive growth in the last two decades.
- Art of surgery has gone through a complete evolutionary process due to antisepsis, antibiotics, anesthesia and the concept of aseptic surgery spread over centuries.
- Laparoscopic surgery has witnessed major changes only in the recent past.

MAJOR BREAKTHROUGHS

- Invention of incandescent bulb by Thomas Edison
- Lens Scopes 1870-80
- Rod lens system by Hopkins 1950
- Fibre optic cold light transmission 1960.
- Computer chip video camera 1980.

EARLY DEVELOPMENTS

- First modern day endoscope 'LICHTLEITER" developed by Philip Bozzini of Austria.
- Boesh 1936 tubal ligation
- John Veress developed a spring loaded needle for creation of pneumothorax in patient with tuberculosis.
- Raoul Palmer 1940 – intraabdominal pressure monitoring.

MAJOR TECHNOLOGICAL BREAKTHROUGHS

- Kurt Semm
  - Invented insufflator 1966
  - Ist Appendicectomy
- Hasson 1971 – Safe access by minilaparotomy
- Device of CCD – Peritoneal cavity could be viewed through a video monitor.

BEGINNING OF THE ERA OF LAPAROSCOPIC SURGERY

- Laparoscopic appendectomy – 1983 by Kurt Semm.
- Acute appendectomy – 1986 – O'Regon
- Laparoscopic cholecystectomy in Dog – 1985 – Filipi and Mall
- Laparoscopic cholecystectomy – 1987 – Philip Mouret
- CBD Exploration

BEGINNING OF THE ERA OF LAPAROSCOPIC SURGERY

- ☐ Berci 1991 : Lap. Intraoperative cholangiogram
- ☐ Sackier - Transcystic exploration of CBD
- ☐ Stroker Choledochotomy of CBD exploration with closure of CBD over a T tube.

LAPAROSCOPIC INGUINAL HERNIA REPAIR

- ☐ Ger 1982 – Clips
- ☐ IPOM : Tay and Smoor 1991
- ☐ TAPP : Arregui and Dion
- ☐ TEP : Tulucq and McKernan
- ☐ Lap. Vagotomy and Gastrojejunostomy : Bernard Dallemagne
- ☐ Fundoplication : Dellemagne 1991

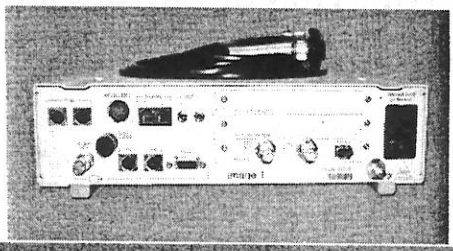
Endosuturing and knotting

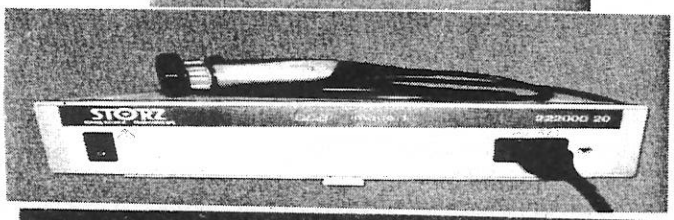
- ☐ Zalton Szabo : Introduced the art of endoscopic suturing techniques

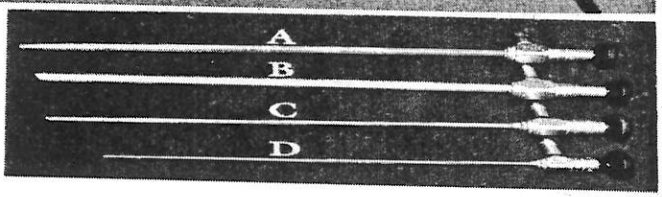
INSTRUMENTATION AND IMAGING SYSTEM IN LAPAROSCOPY

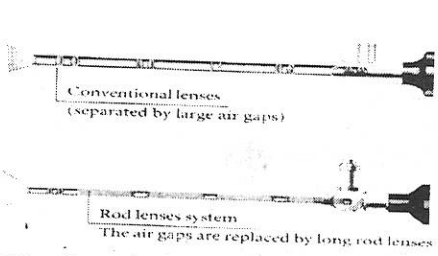
IMAGING SYSTEMS

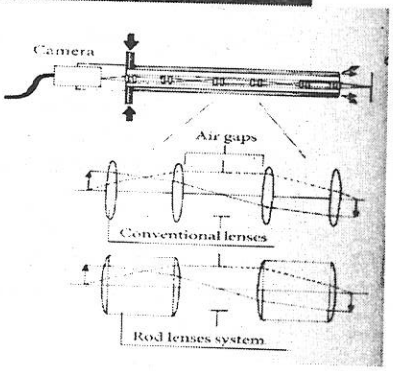
- ☐ Telescope
- ☐ Camera
- ☐ Light Cable
- ☐ Light source
- ☐ Monitor



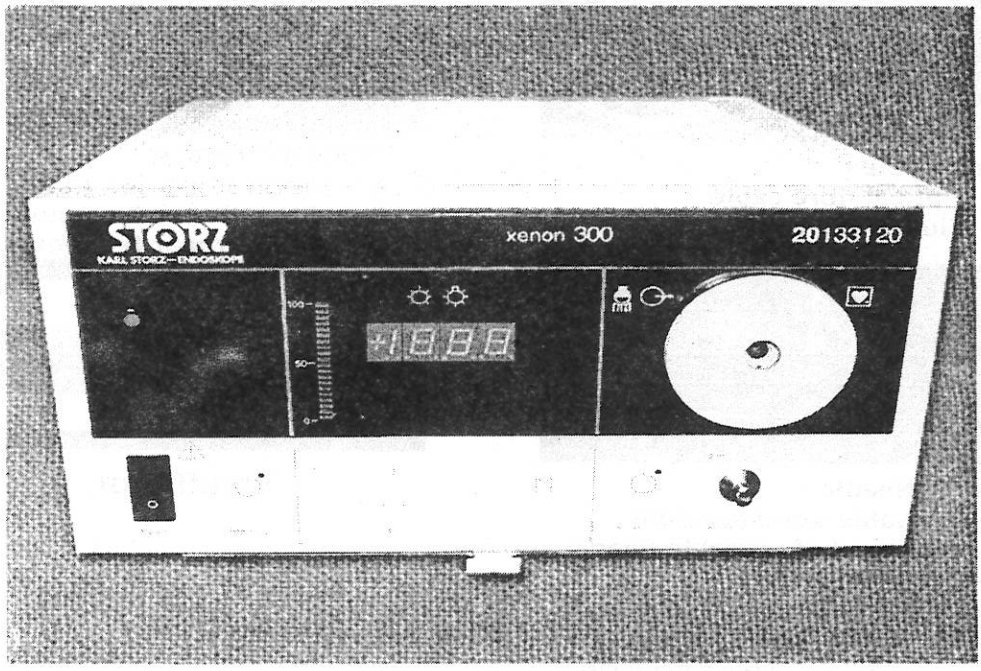








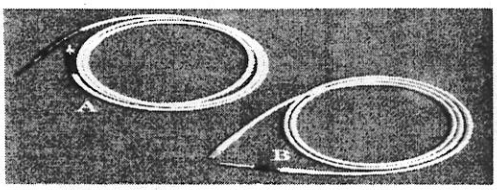
Types of lens



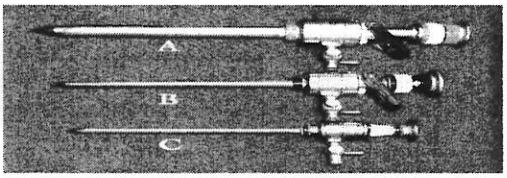
Xenon (300watts) light source

INSTRUMENTATION AND IMAGING SYSTEM IN LAPAROSCOPY

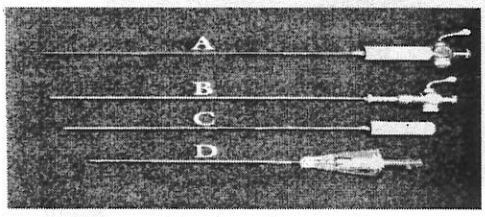
- ☐ Trocars and Cannulae
  - ■ Valve Design
  - ■ Trumpet valve
  - ■ Flap valve
  - ■ Passive valves
- ☐ Hassons Trocar and Cannula
- ☐ Veress Needle
- ☐ Insufflator



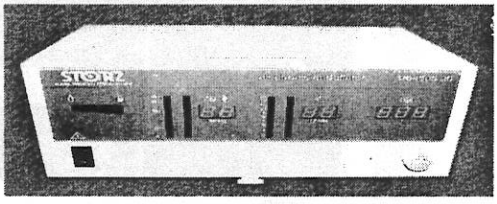
Light Cables
A – Optical fibre cable
B – Fluid filled cable



Types of Trocars
A – 10mm trocar & cannula
B – 5mm trocar & cannula
C – 3mm trocar & cannula



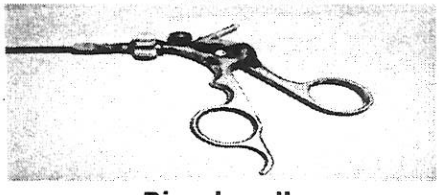
Veress Needle
A – Reusable Veress needle
B – Inner rod of reusable needle
C – Outer sheath
D – Disposable veress needle



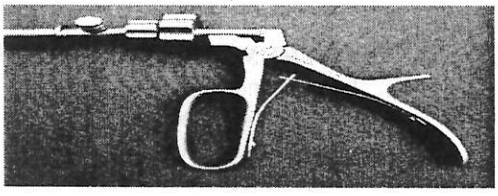
Insufflator

INSTRUMENTATION AND IMAGING SYSTEM IN LAPAROSCOPY

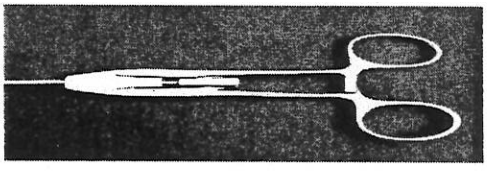
- ☐ Suction and Irrigation Apparatus
- ☐ Surgical Instruments
- ☐ Hand Grips
  - Ring and Shank Handles
  - Pistol Handles

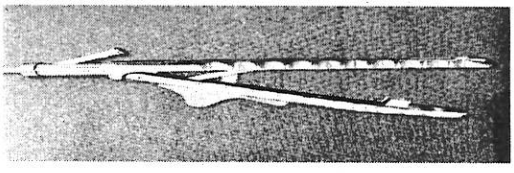


Ring handle



Pistol handle with finger grip





Ideal Design of the handles of laparoscopic instruments

- Grip opening between 65 -90mm
- Ring dimension : length 30mm, width 24mm
- Angle between grip and tube between 14o and 24o.
- Presence of spring
- Opening and closure by flexors/extensors of the fingers
- Thumb use for the rotation knob
- Big contact area
- Little opening/closing force required

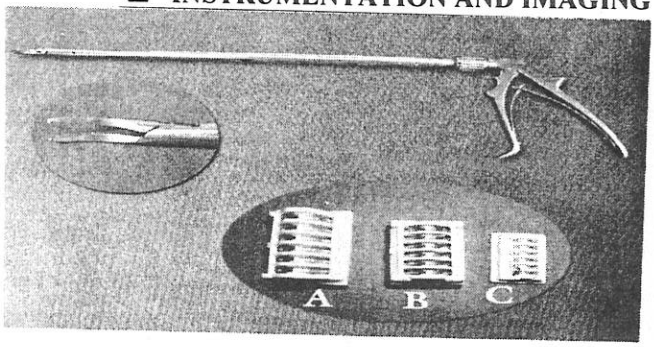
INSTRUMENTATION AND IMAGING SYSTEM IN LAPAROSCOPY

TYPE OF INSTRUMENTS

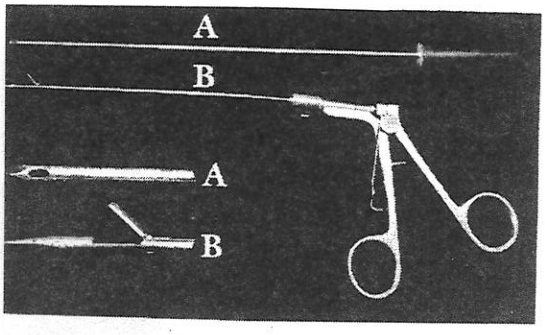
- Dissecting instruments
- Clip appliers

SUTURE ASSISTED INSTRUMENTS AND DEVICES

- Needle holders
- Suture passer devices
- **INSTRUMENTATION AND IMAGING SYSTEM IN LAPAROSCOPY**



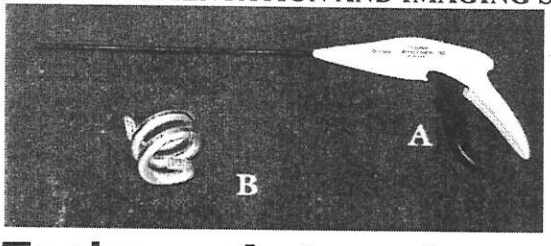
Reusable clip applier



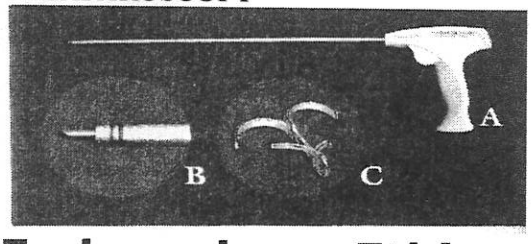
Port closure needle

- **Fixation Devices**
  - **Tackers and other fixation devices**
- **Endoanchor**

INSTRUMENTATION AND IMAGING SYSTEM IN LAPAROSCOPY

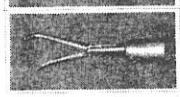


Tacker – Auto suture

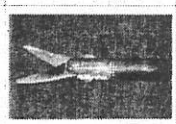
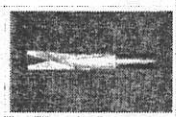
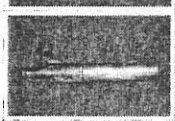
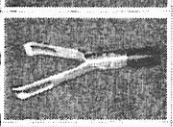
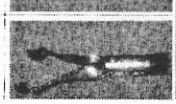


Endoanchor - Ethicon

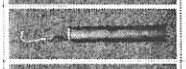
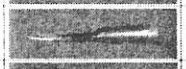
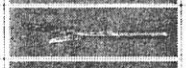
Instruments and their practical uses

Types	Description	Photograph	Use	Remarks
Dissectors	Maryland		Calots dissection, Isolation of vascular pedicles, Dissection in hernias	Basic instrument for dissection, either single action or double action jaws *
	Curved dissector with long blades		Dissection	
	Blunt dissector, Grasper(non toothed, serrated jaws, atraumatic)		Aids during dissection with Maryland	Commonly used as left hand instrument during suturing*
	Grasper(toothed, serrated jaws, traumatic)		For retraction of gall bladder, extraction of gall bladder	* #
	Grasper(toothed, serrated jaws, traumatic)		For holding thick and edematous gall bladders, removal of foreign bodies	* #
	Right angle		Dissection in difficult areas	*

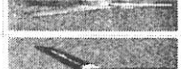
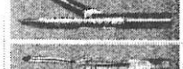
Instruments and their practical uses

Types	Description	Photograph	Use	Remarks
Scissors	Curved Metzenbaum		Dissection, division of cystic duct, vascular pedicles during ligation	Available in stainless steel or disposable material can be used with cautery. Application of cautery should be done only after closing the blades, other wise the sharpness of the instruments might be lost*
	Straight		Division of suture material	*
	Non insulated scissors		Division of suture material	Economical and easy to use
Bowel clamps	Allis (10 mm)		Retraction of omentum during gastrectomy. Used in positioning the anvil and shaft of the circular stapler during laparoscopic anterior resection,esophagogastrectomy	#
	Babcock (10 mm) (reusable)		Retraction of bowel larger bowel in anterior resection, right and left colectomies, rectopexyRetraction of stomach in Hellers cardiomyotomy, fundoplication	#
	Babcock (disposable)		Retraction of bowel larger bowel in anterior resection, right and left colectomies, rectopexyRetraction of stomach in Hellers cardiomyotomy,	These come with an inbuilt locking spring that automatically closes in resting position

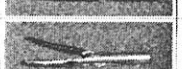
Instruments and their practical uses

Types	Description	Photograph	Use	Remarks
	Achalasia scissors		Used in Heller's cardiomyotomy	Specially designed for division of muscle without injuring the mucosa*
Hooks	L or L shaped		Peritoneal incision near infundibulum during lap cholecystectomy and opening of the bowel	-
Spatula			Dissection of gall bladder from liver bed, coagulation of liver bed after removal of gall bladder	-
	Bowel holding (short)		For manipulation of small bowel during diagnostic laparoscopy	
	Bowel holding (long)		For manipulation of small bowel during diagnostic laparoscopy. Helps in transmediastinal endodissection during transhiatal esophagectomy	
	Claw Forceps		During circular anastamosis in anterior resection (docking of anvil and shaft of the circular stapler)	Traumatic instrument , should be used with caution #

Instruments and their practical uses

Types	Description	Photograph	Use	Remarks
Stone holding forceps	10 mm ,un insulated		For removal of stones from the gall bladder and spilled stones in the peritoneal cavity	
Retractors	10 mm disposable		For retraction of small bowel and left lobe of liver	Screw mechanism at the handle that releases a number of blades that flare out on extension. Another screw mechanism which shifts the axis of the tip of the instruments as shown in the figure
	5 mm stainless steel		For retraction of duodenum and colon during difficult dissection in the Calot's triangle	Economical and simple design
Biopsy forceps	5 mm		For peritoneal biopsy and liver biopsy.	Easy to use
Cholangiogra m forceps	Olsen Clamp		For cannulation of cystic duct during CBD exploration.	It is a must for CBD exploration

Instruments and their practical uses

Types	Description	Photograph	Use	Remarks
Suction nozzle	5 mm, stainless steel, Toggle mode, finger manipulation*		Suction and irrigation. Can also be used as finger for blunt dissection	Application of the probe over a piece of gauze piece at the tip prevents in rapid loss of pneumoperitoneum
Hydatid trocar	Palanivelu's Hydatid System		Laparoscopic Evacuation of Hydatid cyst	Refer Hydatid chapter for elaborate information
Needle holder	Ethicon type 5 mm		For endosuturing and knotting	Very versatile instrument (Refer hemostasis and suture approximation
	Ethicon type 8 mm		For endosuturing and knotting	Very versatile instrument (Refer hemostasisand suture approximation)
	Conventional needle holder , Coaxial ring handle		We use it mainly for retraction of liver in fundoplaction, for following the thread in intracorporeal suturing	

ANAESTHESIA FOR LAPAROSCOPIC SURGERY

- Respiratory changes during laparoscopy
  - Due to pneumoperitoneum
  - Due to position of the patient
  - Influence of anesthesia
- Cardiovascular changes during laparoscopy
  - Effect of position
  - Effects of pneumoperitoneum
- Hypothermia

EFFECT OF PNEUMOPERITONEUM

Respiratory System

- ↑ PaCO2
- Splinting of diaphragm
- Lung volumes and capacities ↓
- Lung compliance ↓
- Airway resistance ↑
- V/Q mismatch ↑
- Hypoxia and hypercarbia

EFFECT OF PNEUMOPERITONEUM

Cardio Vascular System

- Hypercarbia and sympathetic stimulation
- Tachycardia, arrhythmias and ↑ BP
- SVR ↑
- Compression of IVC; reduced venous return
- Cardiac output ↓
- Splanchnic blood flow decreased; delayed return of bowel function

EFFECT OF PNEUMOPERITONEUM

Renal

- Renal blood flow ↓
- GFR and urine output ↓
- Intracranial pressure ↑ intraocular pressure ↑
- Regurgitation and aspiration
- Hypothermia
- Influenced by change of position and anesthesia

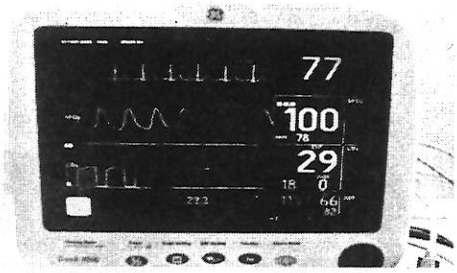
COMPLICATIONS OF LAPAROSCOPY

- Traumatic complications
- Respiratory complications
- Gas embolism
- Aspiration of gastric contents
- Cardio-vascular complications
- Nerve injury

ANAESTHETIC MANAGEMENT

- Patient selection

- ☐ Premedication
- ☐ Monitoring
- ☐ Technique of anesthesia
- ☐ General Anesthesia
  - ■ Local and regional anesthesia
  - ■ Recovery and postoperative period
- ☐ Thoracoscopy



STERILIZATION AND DISINFECTION OF LAPAROSCOPIC INSTRUMENTS

- ☐ Handling of laparoscopic instruments is the biggest challenge to operative room.
- ☐ Risk of bacterial and viral infections related to laparoscopy are a significant problem.

STERILIZATION AND DISINFECTION OF LAPAROSCOPIC INSTRUMENTS

- ☐ Cleaning
- ☐ Sterilization
- ☐ Disinfection
  - ■ Efficacy of disinfection
  - ■ Alcohols
  - ■ Aldehydes
- ☐ Chlorine dioxide
- ☐ Per oxygen compounds
- ☐ Super oxidized saline

Umbilical puncture using number 15 knife blade

Method of inserting the Veress needle

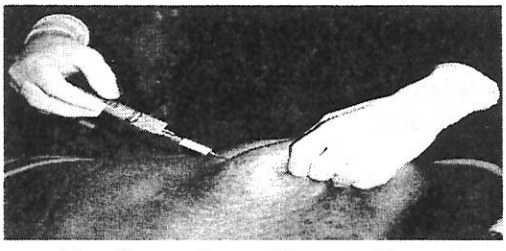
LAPAROSCOPIC SPACE ACCESS

- ☐ Pneumoperitoneum
- ☐ Extraperitoneal space approach

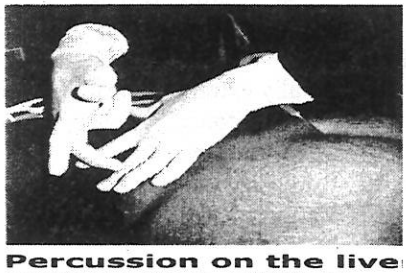
LAPAROSCOPIC SPACE ACCESS PNEUMOPERITONEUM

- ☐ Close Veress Needle Technique
- ☐ Veress Needle
- ☐ Umbilical Puncture
- ☐ Confirmation of needle position
- ☐ Insufflation of Co2

LAPAROSCOPIC SPACE ACCESS



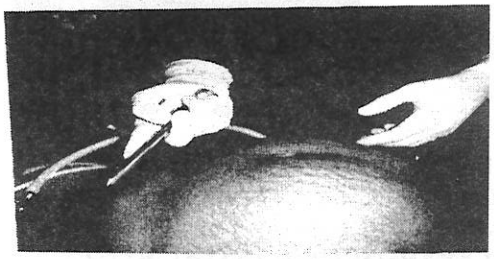
Performing the saline test

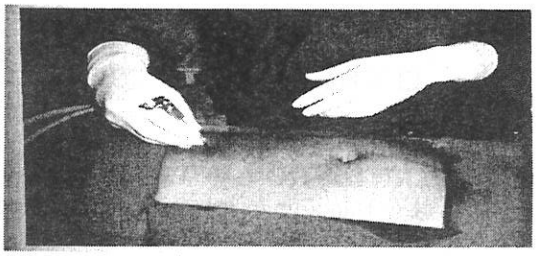


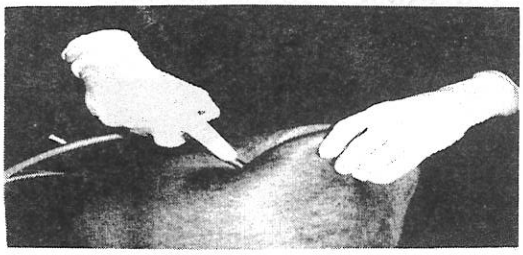
Percussion on the live obliteration of liver dullness is assessed

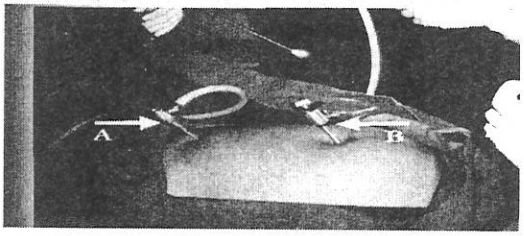
LAPAROSCOPIC SPACE ACCESS

- ☐ Placement of Trocars
- ☐ Alternate puncture sites
- ☐ Open laparoscopy technique









Insertion of the trocar in the mbilicus

Insertion of the trocar in the umbilicus. Abdominal wall lifted by the left hand

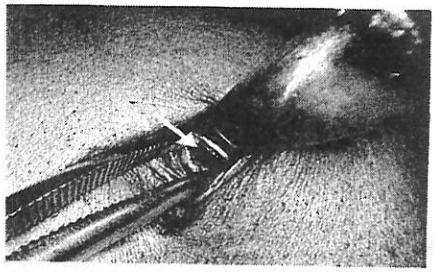
3mm trocar is placed in the epigastrium and the umbilical port is placed under laparoscopic guidance
A – 3mm epigastric port
B – 5mm umbilical port

EXTRAPERITONEAL SPACE APPROACH

- ☐ Indications
- ☐ Anatomic considerations
- ☐ Extraperitoneal approach
- ☐ Choice of insufflating Gas
  - ■ Air
  - ■ Carbon Dioxide
  - ■ Nitrous oxide

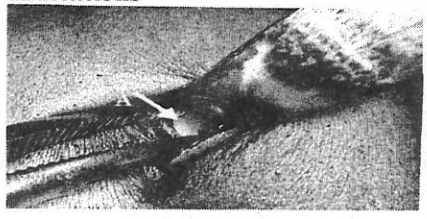
Indications

- ☐ Totally extraperitoneal (TEP) inguinal hernioplasty.
- ☐ Retroperitoneal endoscopically assisted spine surgery
- ☐ Renal surgery
- ☐ Adrenalectomy
- ☐ Varicocele ligation



Subumbilical incision, anterior rectus Sheath is exposed and with a small incison over the anterior rectus sheath
A – Rectus muscle

Indications



Retracting the rectus muscle laterally Posterior rectus sheath is exposed
A – Posterior rectus sheath

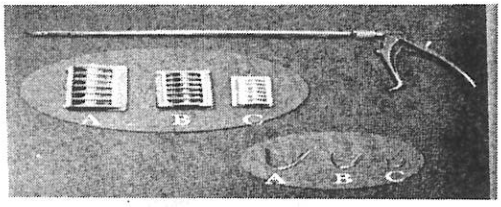
LAPAROSCOPIC HEMOSTASIS

- ☐ MECHANICAL METHODS OF HEMOSTASIS
- ☐ ENERGY – INDUCED HEMOSTASIS

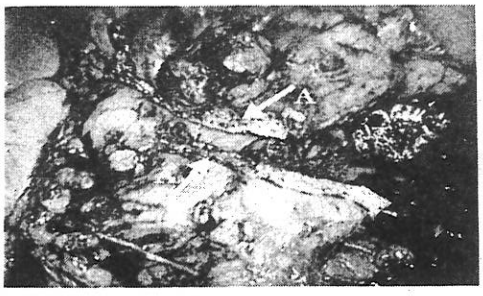
LAPAROSCOPIC HEMOSTASIS
MECHANICAL METHODS OF HEMOSTASIS

- ☐ Endoscopic clipping method
- ☐ Linear stapling device
- ☐ Pretied loop ligatures
- ☐ Simple ligatures
- ☐ Suturing

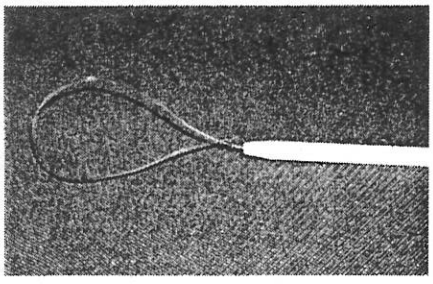
LAPAROSCOPIC HEMOSTASIS



Reusable clip applicator
A – Large clip (11mm)
B – Medium large (9mm)
C – Medium (7mm)



Division of inferior mesenteric pedicle using endo GIA vascular stapler
A – divided and (3 rows of clips seen)

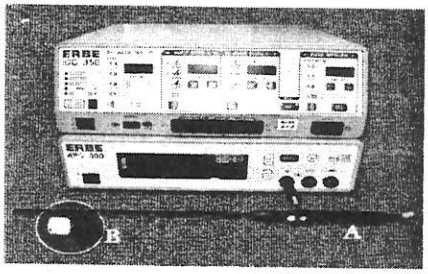


Catgut endoloop

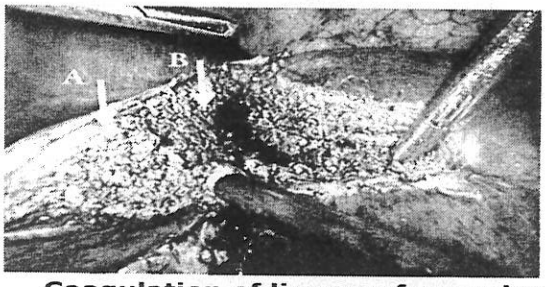
- ☐ Other injuries

LAPAROSCOPIC HEMOSTASIS

- ☐ Ligasure (Valleylab)
- ☐ Argon – Enhanced electro surgery
- ☐ Ultrasonic dissection
- ☐ Cavitational ultrasonic surgical aspirator

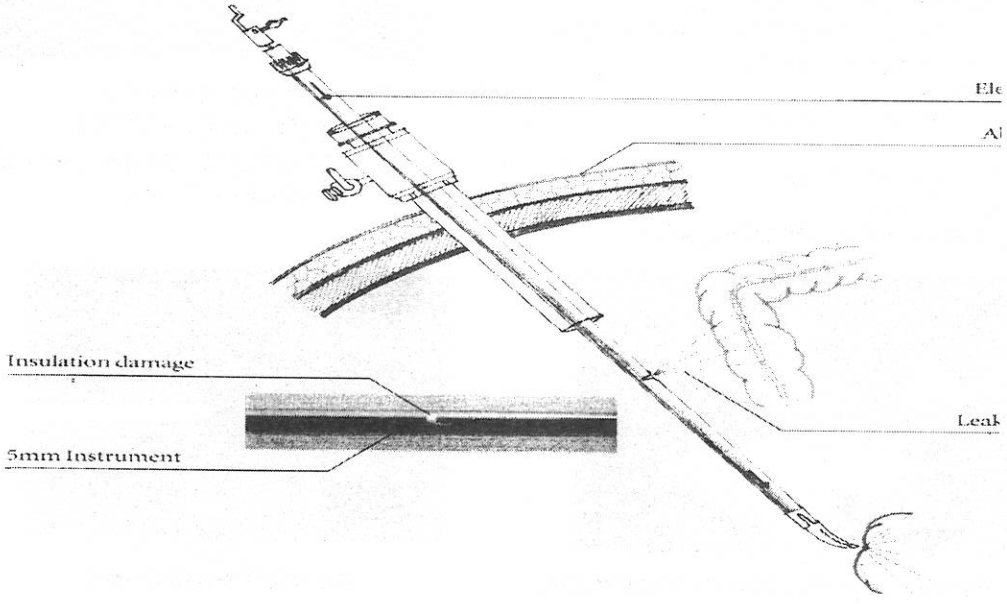


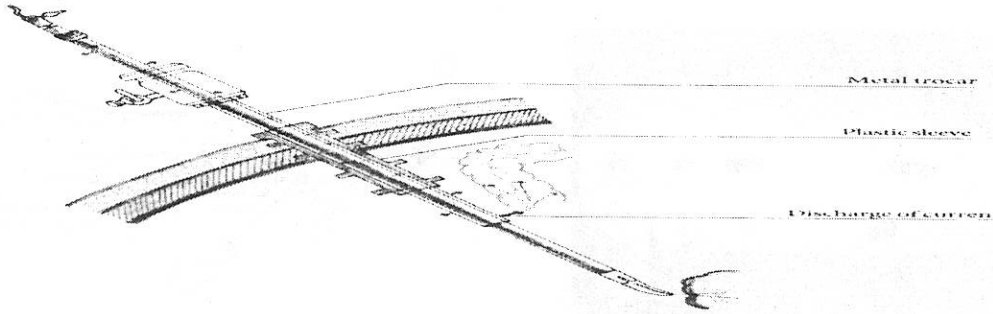
Argon enhanced electro surgery unit
A – Laparoscopic 5mm instrument



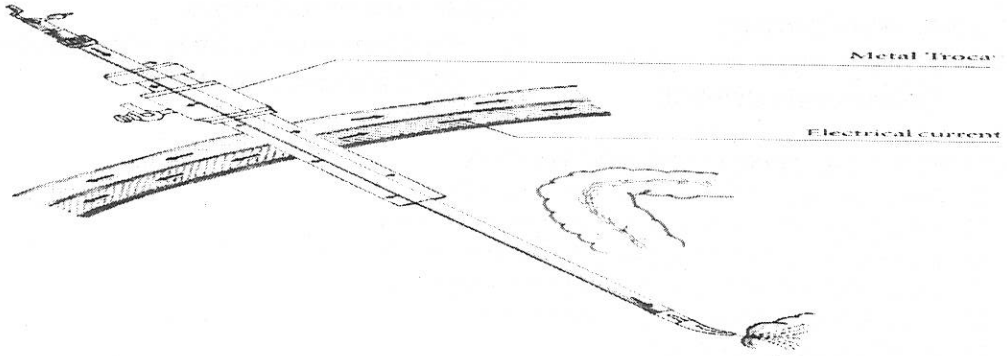
Coagulation of liver surface using argon beam coagulation
A – Coagulated surface
B – Non coagulated surface

Insulation failure injury

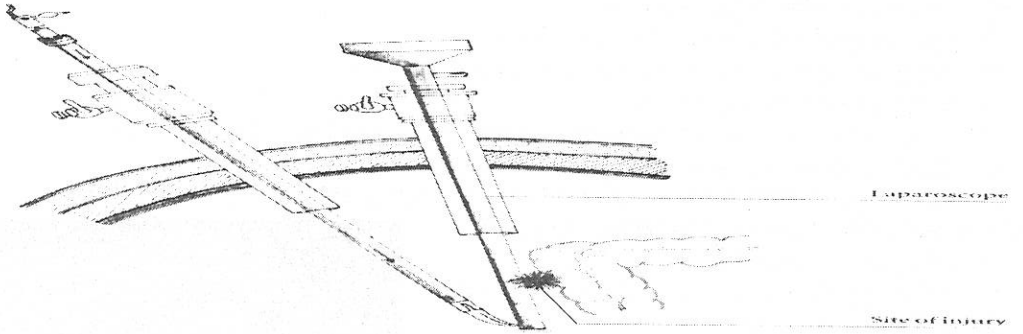


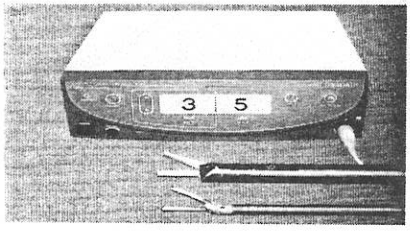


Return of electrical current in the anterior abdominal wall through the metal trocar

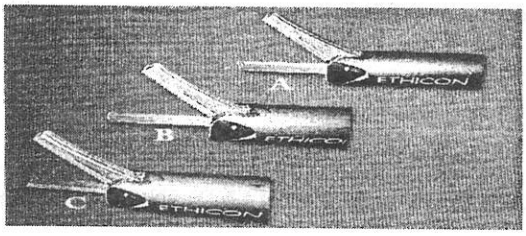


Direct coupling injury

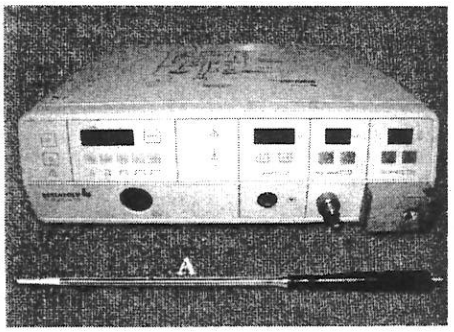




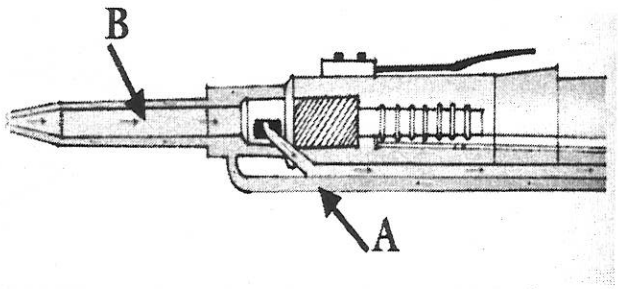
Ultracision harmonic scalped generator with 10mm, 5mm hand instruments



Tip of the 10mm hand instrument
A – Sharp edge of lower blade
B – Blend edge of lower blade
C – Flat edge of lower blade



CUSA equipment
A – 10mm laparoscopic hand instrument



CUSA –internal view
A – Continuous water irrigation
B – continuous suction

LAPAROSCOPIC TISSUE APPROXIMATION

- ☐ EQUIPMENT AND INSTRUMENTATION
- ☐ ERGONOMICS AND HANDLING OF CAMERA
- ☐ PASSAGE OF NEEDLE INTO ABDOMINAL CAVITY
- ☐ LOADING OF NEEDLE BY NEEDLE HOLDER
- ☐ ADJUSTING THE NEEDLE DIRECTION
- ☐ HANDLING OF NEEDLE

LAPAROSCOPIC TISSUE APPROXIMATION

- ☐ EXTRA CORPOREAL KNOTS
- ☐ PREFORMED SLIPPING ENDOLOOPS
- ☐ INTRACORPOREAL SUTURING AND KNOTTING
- ☐ PORT CLOSURE DEVICES
- ☐ LAPAROSCOPIC ASSISTED MECHANICAL STAPLING TECHNIQUES
- ☐ STAPLE CONFIGURATION
- ☐ ACCESS ROUTES FOR STAPLERS IN LAPAROSCOPY

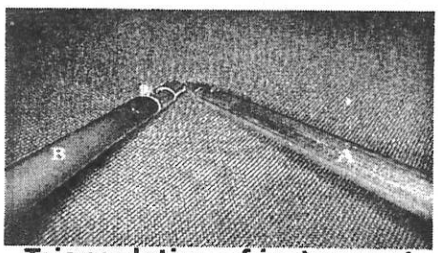
LAPAROSCOPIC TISSUE APPROXIMATION

- ☐ LINEAR STAPLERS
- ☐ INTRALUMINAL (CIRCULAR) STAPLERS
- ☐ ENDOSTITCH

Equipment and Instrumentation

- ☐ Video equipment
- ☐ Instrumentation
- ☐ Trocars
- ☐ Suture material
- ☐ Needles

ERGONOMICS AND HANDLING OF CAMERA

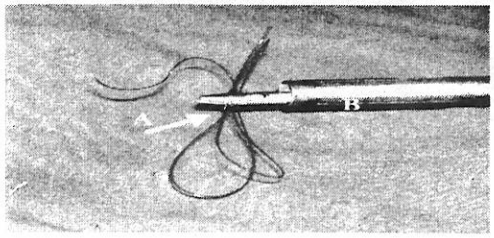


Triangulation of instruments For suturing
A – Needle holder
B – Holding forceps

Triangulation of the instruments and the camera trocar is of paramount importance in endosuturing.

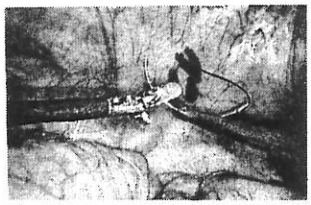
Camera port should be at the center and the right and left hand working ports should be placed on either sides of the camera.

PASSAGE OF NEEDLE INTO ABDOMINAL CAVITY



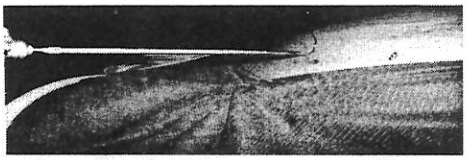
ıling of the needle into the reducer ıolder with in the and holding the thread the needle

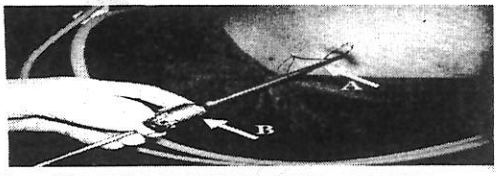
PASSAGE OF NEEDLE INTO ABDOMINAL CAVITY



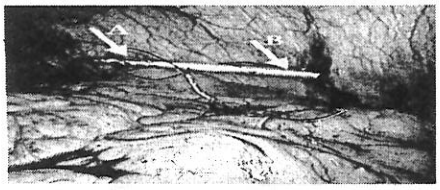
Direct puncturing of the needle through abdominal wall

PASSAGE OF NEEDLE INTO ABDOMINAL CAVITY

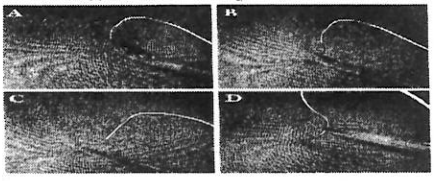




A – Needle holder with needle
B – 5mm cannula



Loading of needle by needle holder



☐ Place the needle in horizontal position

☐ Lower jaw of the needle holder is introduced behind the needle and tissue is being pressed.

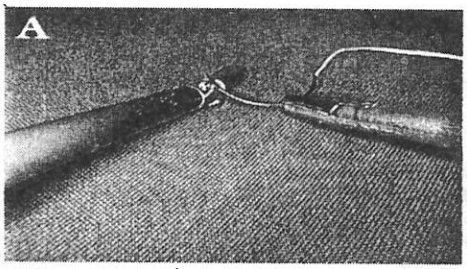
☐ While pressing the tissue down, the needle will be lifted automatically and then held by the needle holder.

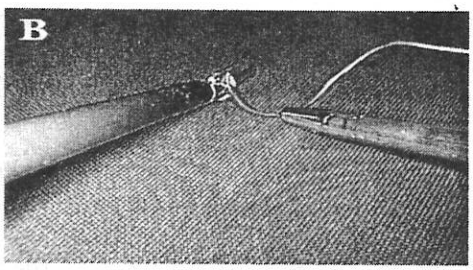
☐ Rotate the needle holder to check the right angle

Adjusting the needle

☐ Push the needle with the left hand instrument. During this time the needle is held in gentle grip.

☐ Correctly positioned needle

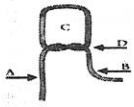




EXTRA CORPOREAL KNOTS

- ☐ Externally created slip knots
- ☐ Extracorporeal surgeon's knot
- ☐ Endoscopic babcock clamp method

PREFORMED SLIPPING ENDOLOOPS



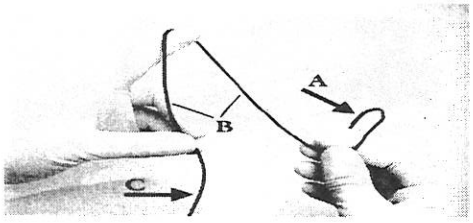
Making first half knot
A – Standing part
B – Tail end
C – Functional part
D – Half knot

Three and half turns of the tail end over the functional part

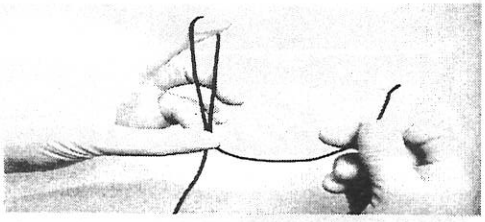
Making knot to the tail end over one limb of the functional part

By tightening, Roedor's knot is formed

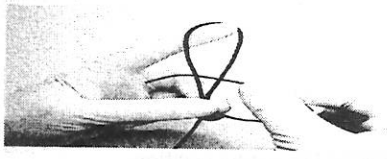
Modified gem loop knot



A-Tail end B – Bight
C – Standing part



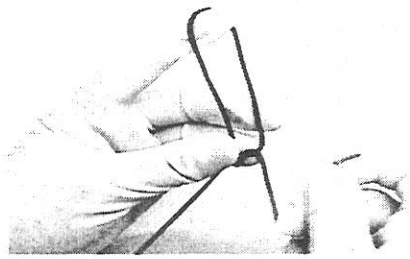
Loop is formed by holding the standing part & the bight together



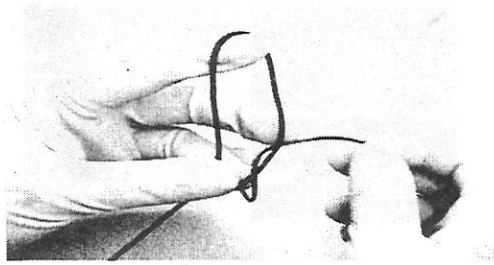
The tail end is passed over the first loop to form the second loop

Tail end is brought out through the second loop

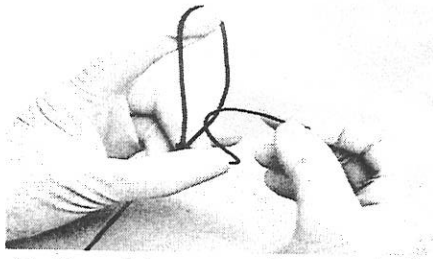
Modified gem loop knot



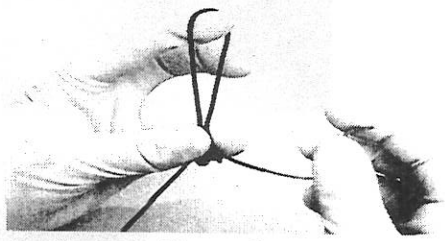
First turn is secured between thumb and the ring finger



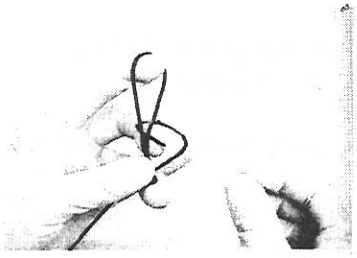
Second turn, similar to the Ist turn



Tail end is passed over the lateral limb of the Ist loop



Completion of second turn



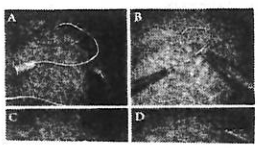
☐ The tail end is brought over the first loop to form the third loop. A knot is formed by pulling the tail end through the third loop

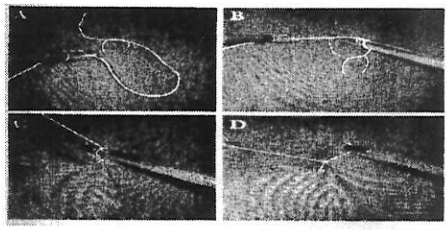
INDICATION FOR ENDO LOOP APPLICATION

- ☐ Ligation of pedicles
- ☐ Temporary closure of the gallbladder wall perforation to prevent bile leak or stone slippage and closure of the wide cystic duct during laparoscopic cholecystectomy.
- ☐ Ligation of the base of the appendix.
- ☐ Control of the bleeding vessels
- ☐ Ligation of the neck of the hernias sac in indirect hernia.

Intracorporeal suturing and knotting

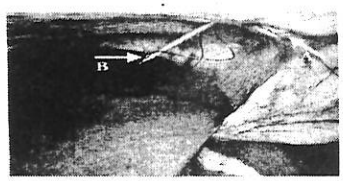
- ☐ Square and surgeon's knot
- ☐ Tightening of the first half knot
- ☐ Square knot twisting method

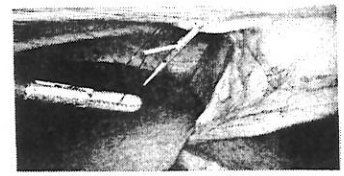




- ☐ Suturing technique
  - ■ Interrupted suturing
  - ■ Continuous suturing
- ☐ Starting a running suture
- ☐ Completing a running suture

PORT CLOSURE D

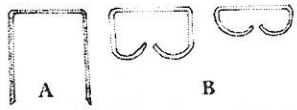




Laparoscopic Assisted Mechanical Stapling Techniques

- ☐ Staplers help laparoscopic surgeons in tissue approximation, transection of blood vessels in major procedures, resection of organs and lung biopsy during thoracoscopy.
- ☐ Staplers generally reduce the time required for various reconstructions during major laparoscopic procedures.

STAPLE CONFIGURATION

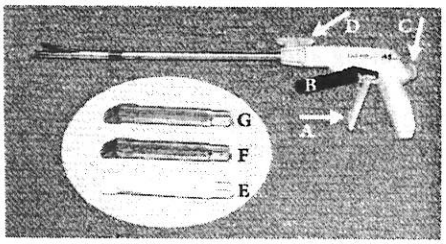


Configuration of pin in the endo linear cutter

A – Before firing
B – After firing

Linear staplers

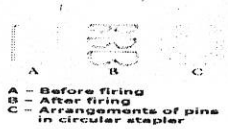
- ☐ Application of linear stapler
- ☐ Applications of Linear cutter



Endo GIA stapler

- ☐ Esophagogastrostomy following esophagogastrectomy or esophagojejunostomy following total gastrectomy
- ☐ Anterior resection, low ultra low transection of rectum.

Intraluminal (Circular)staplers



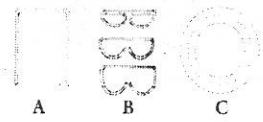
- ☐ Application of intraluminal staplers
- ☐ Circular stapling technique

Intraluminal circular stapler

USE OF STAPLERS IN LAPAROSCOPY

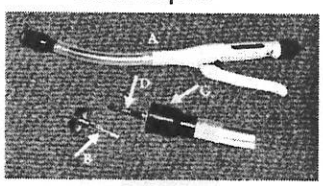
- ☐ Gastrojejunostomy in gastric outlet obstruction
- ☐ Cholecystojejunostomy in obstructive jaundice
- ☐ Cystogastrostomy in pseudocyst pancreas
- ☐ Esophagogastrostomy following esophagogastrectomy or esophagojejunostomy following total gastrectomy
- ☐ Anterior resection, low ultra low transection of rectum.

Intraluminal (Circular)staplers

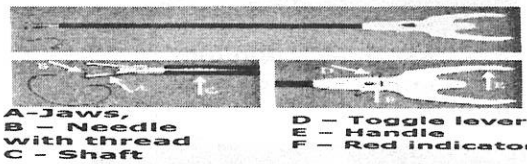


A – Before firing
B – After firing
C – Arrangements of pins in circular stapler

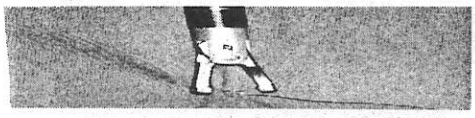
- ☐ Application of intraluminal staplers
- ☐ Circular stapling technique



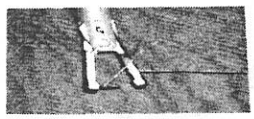
Intraluminal circular stapler



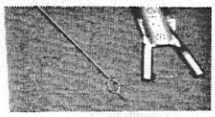
Needle shifted to other jaw



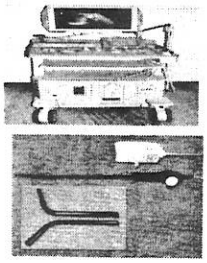
The jaws of the endo stitch are Placed through the tissue



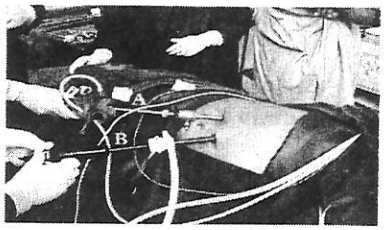
Needle shifted to The opposite jaw



Completion Square knot



- Ultrasonic images are produced according to the principles of sonar and radar.
- Transducer of the ultrasound probe is made up of basic elements called piezoelectric cells

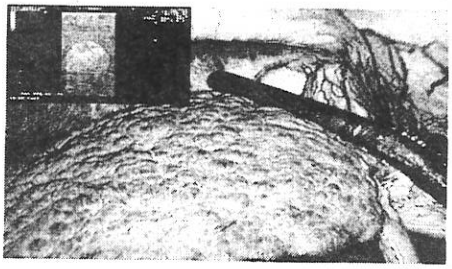


Laparoscopic ultrasound

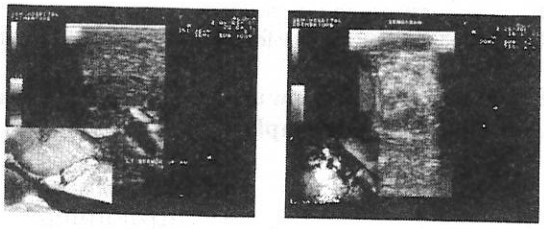
- A – Laparoscope
- B – Ultrasound probe

INDICATIONS

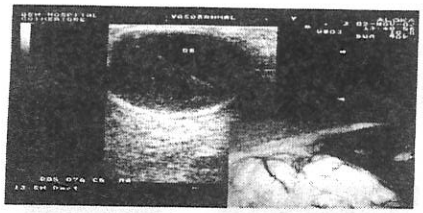
- Liver
- Gallbladder and biliary tree
- Pancreas
- The gastroesophageal tumours



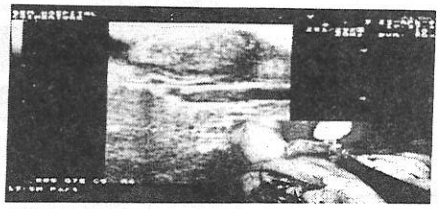
Hepatic mass in the 8th segment of liver



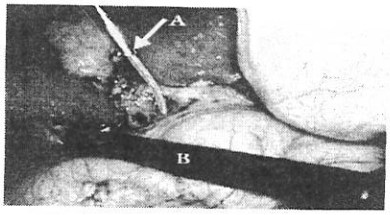
Colour doppler study



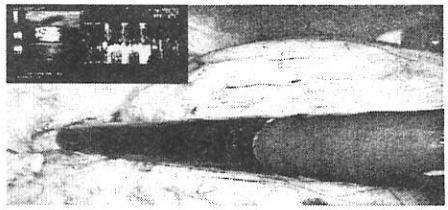
Inflamatory mass in the gall bladder areas shows empyema of gallbladder

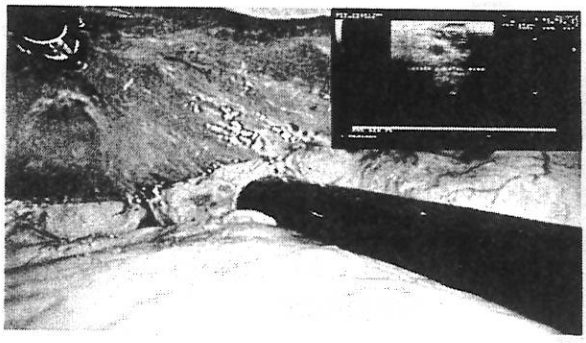


Pancreas during Whipple's procedure showing periampullary growth

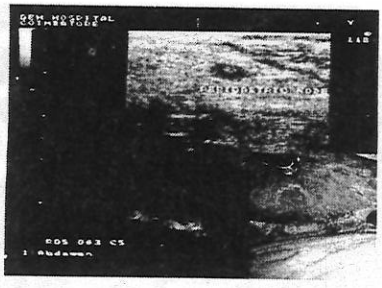


CBD stone : A – Basket
B – Ul;trasound probe

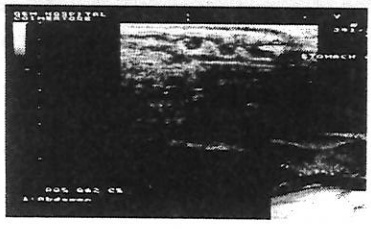




Laparoscopic ultrasound study shows lesser omental node



Perigastric node



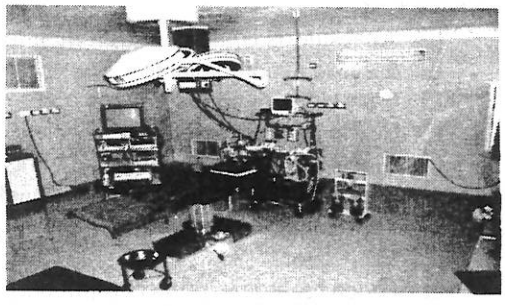
Cross sectional view of

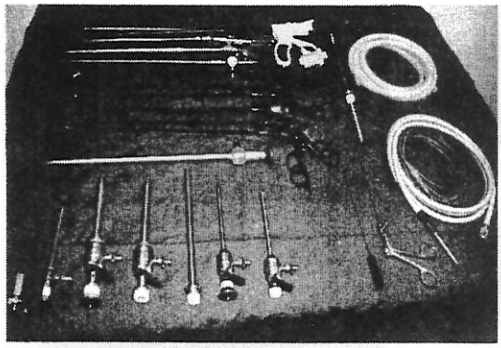
ROOM LAYOUT, TROUBLESHOOTING AND COMPLICATIONS OF LAPAROSCOPY

- **General Considerations**
  - Operative room setup
  - Optimum position of equipments and team
  - Check list

Optimum position of equipments and team

- Surgeon's position
- Number of assistants (one or two)
- Staff nurse
- Monitors the video image must be in straight line with the ports and surgeon.
- Equipment trolley, anesthesia trolley etc.





Arrangements of laparoscopic instruments on the scrub nurse's table

- It is very important to come to the operating room sufficiently early to assure proper set-up and to ascertain that all instruments are available and in good working condition.

Optimum position of equipments and team

- Surgeon's position
- Number of assistants (one or two)
- Staff nurse
- Monitors the video image must be in straight line with the ports and surgeon.
- Equipment trolley, anesthesia trolley etc.

Check List

- Anaesthesia equipment with monitors
- Electric operating table
- Two video monitors
- Suction irrigators
- Electrosurgical unit with grounding pad equipped with current monitoring system.

Laparoscopic equipment in a cart on wheels is important for shifting to various positions.

1. Light source
2. Insufflator
3. Video recorders, printers (optional)
4. Camera processor unit
5. C-arm X-ray unit

Instrument table with following laparoscopic instruments

1. No. 15 scalpel blade and handle
2. Veress needle/Hasson's cannula
3. Gas insufflation tube
4. Fibreoptic cable to connect laparoscopic with light source

Instrument table with following laparoscopic instruments

5. Video camera with cord

6. Electrocautery cable for instruments
7. A set of hemostats
8. Small retractors
9. Trocars and cannula size and number according to the procedure and surgeon's choice

Check List

- ☐ **Instrument table with following laparoscopic instruments**

10. Atraumatic graspers
11. Locking toothed graspers
12. Needle holders
13. Dissectors-curved, straight, right angled
14. Bowel grasping forceps
15. Babcock forceps

Instrument table with following laparoscopic instruments

16. Scissors
17. Fan retractors – 10mm or 5mm
18. Specialized retractors such as endoscopic curved retractors
19. Biopsy forceps
20. Trucut biopsy core needle

Monopolar electrocautery dissection tools

1. L-shaped hook
2. Spatula-spade type dissector coagulator
3. Ball tipped coagulator

Ultrasonic activated scalpel

1. Scalpel – 10 or 5mm
2. Ball coagulator specially for control
3. Hook coagulator
4. Scissor dissector/coagulator
5. Spade type dissector

Endo coagulator probe (optional)Basket containing

1. Clip appliers – medium, medium, large
2. Endoscopic stapling devices
3. Pretied suture ligatures
4. Endoscopic suture materials

BASIC ROOM SETUP

- ☐ With the operating table position and all equipment in the room, reassess the configuration.
- ☐ Two full CO2 cylinders in the room, one will be used for the procedure, second is spare.

Attention to detail is important

- ☐ Assure table tilt mechanism is functioning
- ☐ Consider leg support and extra safety strap for large patients.
- ☐ Check the X-ray cassette plate for proper position.
- ☐ Notify the radiology technician.
- ☐ Assure the availability of Foley's catheter and Ryle's tube

- ☐ Insufflator and confirm that the alarm is set appropriately.
- ☐ Confirm the presence of full volume in the irrigation fluid container.
- ☐ Electrosurgical unit, auditory alarm of the machine is functioning properly.

BASIC ROOM SETUP

- ☐ **Before starting the procedure, connect the light cable and camera to the laparoscope.**

i. Check the Veress needle for proper plunger/spring action and assure easy flushing through stopcock and needle channel
ii. Confirm that the stopcocks on all cannula are closed.
iii. Check the rubber visers for cracks
iv. Assure free movements of instrument handles and jaws.

PREOPERATIVE WORK UP

- ☐ A proper pre-operative work up will minimize the intra and post operative complications.
- ☐ Pre-operative preparations are similar to those of any general surgical patient.
- ☐ Evaluation of cardiac and respiratory systems is mandatory to ensure a safe operation.

Pre operative check list

- ☐ History and physical examination
- ☐ Evaluation of other medical problems
- ☐ Evaluation of cardiac and respiratory systems
- ☐ Normalisation of fluids and electrolytes
- ☐ Antibiotics
- ☐ Prophylaxis against deep venous thrombosis
- ☐ Evaluation of genito-urinary system
- ☐ Appropriate laboratory and radiologic studies
- ☐ Informed consent for laparotomy if necessity arises.

SELECTION OF PATIENTS FOR LAPAROSCOPIC PROCEDURE

- ☐ Contraindications to Laparoscopy
- ☐ There are certain risk factors that make the patient absolutely or relative contraindicated for laparoscopy.

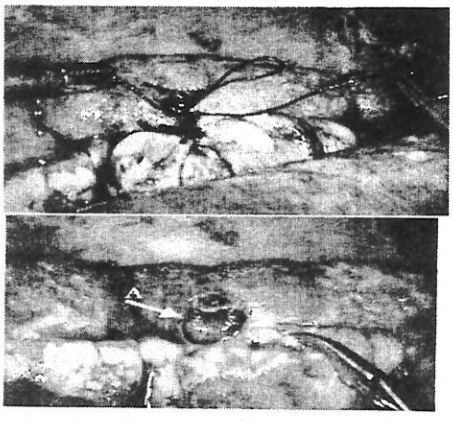
Contraindications to Laparoscopy

ABSOLUTE

- ☐ Hypovolemic shock, massive
- ☐ Bleeding, hemodynamic instability
- ☐ Severe cardiac disease

RELATIVE

- ☐ Peritonitis of uncertain origin
- ☐ Abdominal wall hernia
- ☐ Diaphragmatic hernias
- ☐ Uncorrected coagulopathies
- ☐ Cirrhosis of liver
- ☐ Portal hypertension
- ☐ Multiple previous surgical procedures
- ☐ Late stage pregnancies



COMPLICATIONS OF LAPAROSCOPY

- ☐ **General Complications**
- ☐ **Complications of anaesthesia**

a) Complications of pneumoperitoneum
b) Pneumothorax, pneumomediastinum
c) Carbon-dioxide embolisation
d) Hypercarbia with acidosis
e) Patient positioning
f) Trocar related
g) Hemodynamic changes

COMPLICATIONS OF LAPAROSCOPY

- ☐ Bowel injuries
- ☐ Vascular injuries
- ☐ Incisional hernia at port sites
- ☐ Bladder injuries
- ☐ Wound Infections

COMPLICATIONS OF LAPAROSCOPY

- ☐ Anaesthesia
- ☐ CO2 pneumoperitoneum
- ☐ Patient position
- ☐ Trocar site complication

PRIMARY FACTORS

- ☐ A. Laparoscopic exposure methods
  - ■ CO2 pneumoperitoneum
  - ■ Other gases like N2 O
  - ■ Gasless systems
- ☐ B. Patient positioning
  - ■ Trendelenburg
  - ■ Reverse Trendelenburg

SECONDARY FACTORS

- ☐ A. Patient physiologic status
  - ■ Age
  - ■ Co-morbidity
  - ■ Acute illness
  - ■ Chronic illness
  - ■ Volume status
  - ■ Medications
- ☐ B. Duration of operation

CONTROL OF TROCAR SITE BLEEDING

- ☐ Compression by the trocar
- ☐ Temporarily with a Foley's catheter balloon
- ☐ Coagulation
- ☐ Suture ligation intra-corporeally or extra-corporeally
- ☐ Laparotomy

PROCEDURE RELATED COMPLICATIONS

- ☐ Tumour seedling
- ☐ Bile duct injury
- ☐ Bile leaks
- ☐ Retained gall stones induced abscess
- ☐ Bleeding
- ☐ Port site hernia
- ☐ *"Look behind you at what you have already accomplished*
- ☐ *Look up and believe that the sky is the limit*
- ☐ *Look down to make sure you're on the right path*
- ☐ *Look ahead and claim success in everything you do"*

TRAUMA & DISASTER MANAGEMENT

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Introduction

- Rapid industrialization and nuclear age are the brighter side of human welfare whereas their darker side along with terrorism gives rise to Major Trauma.
- The vulnerability of the Indian sub continent towards disasters is widely recognized.
- Disasters such as floods, earthquakes, cyclones, landslides, drought and famine, fire etc are quite common in one or other part of our country affecting a large number of populations.
- The disaster can be defined as a serious disruption of the functioning of a society causing wide spread human, material and environmental losses.
- In addition to the above, the incidences of accidents have increased many folds due to increase in number of vehicles on road running at very high speed.
- The sophistication and fast life has made necessary to be on your own transport resulting in an increase in different fast speed vehicles, poor traffic rules and road congenstion etc. contributing to increased incidences of accident.
- Similarly bomb blast and terrorism has paralyzed life at many places leading to death and trauma to a large number of populations Railway accidents and plane crashes have also increased to a great extent.
- The "Golden Hour" Concept is that if a trauma patient with a survivable injury who is in clinical shock does not receive the definitive care necessary to reverse the process within 1 hour after entering the shock state, his long term survival is below 10% no matter how good the care is after that 1 hour or 60 min.
- For every 30 min. delay in the treatment of a injured patient the mortality rate increase by 300%.

Disaster Management in the Health Sector in India

Different organization are framed at the Central, State, District and City level. There is a Central Technical departments Emergency Medical Relief Division of Directorate General of Health Services in the Ministry of Health and Family Welfare for the management of crisis situation.

ADMINISTRATIVE SET UP FOR CRISIS MANAGEMENT

- DIRECTOR GENERAL OF HEALTH SERVICES
- ADDITIONAL DIRECTOR GENERAL OF HEALTH SERVICES
- DIRECTOR EMERGENCY MEDICAL SERVICES AND RELIEF
- **At State Level**
  - The task is delegated to the "Relief and Rehabilitation Ministry" who is usually the overall incharge of emergency and Relief organizations.
- **At District Level**
  - A District level Coordination and Review Committee is constituted and headed by the collector as Chairman. He may get in tough with the local bodies Army, Navy, Air force etc for assistance, rescue, evacuation and emergency measures.

Mass Casualty Management

- The casualty management system is different in towns, cities and rural areas.

- In towns and cities following agencies have fleet of ambulances and are available on unified telephone system, they are Police, Fire Services, Hospitals Casualty.
- The ambulances provide transport services.
- In rural areas there is no organized ambulance services where the casualty clearance is usually done by the community and local police and local health officials.

Mass Casualty Management

- The ambulances provide transport services.
- In rural areas there is no organized ambulance services where the casualty clearance is usually done by the community and local police and local health officials.
- The disasters may be classified in the following way to judge the severity and management of resources :-

  Effect on surrounding community may be simple or compound
  - Cause of Disaster-Man made/ Natural Calamity
  - Duration of Cause of Disaster-One hour, 1-24 hours, over 24 hours
  - Radius of Disaster : One Km, Less than 1 km, 1-10 kms, more than 10 kms.
- **Number of Casualties.**
  - Nature of injuries, sustained by the victims.
  - Type of Disaster-Earth Quakes, Land slide, Flood, Cyclone, Accidents-Road, Railway, Air Crash, Trauma by other reasons.
  - Time required by the rescue organizations
- In addition to natural disasters like flood, earthquakes, famines, etc man made disasters can be enumerated as STRANGE

S	-	Social Disturbances
T	-	Terrorism
R	-	Riot
A	-	Accidents
N	-	Nuclear Disaster
G	-	Gas Disaster
E	-	Earthquakes and Epidemics

Management of disasters

- The basic aim in mass casualty incident (MCI) and disaster care is to do the greatest good for the greatest number of Potential survivors
- The patient care priorities are modified to keep as many people alive as possible with the resources available.
- The prime objective is prevention and minimization of death and disability, suffering and loss. This is irrespective of the cause of disaster.
- There are eight basic principles of disaster management which need emphasis.
  - PREVENT - the occurrence, whenever possible
  - MINIMIZE - the number of casualties if can not be prevented
  - PREVENT FURTHER Casualties after initial impact
  - RESCUE - the victims
  - PROVIDE FIRST AID
  - EVACUATE THE injured to medical institution

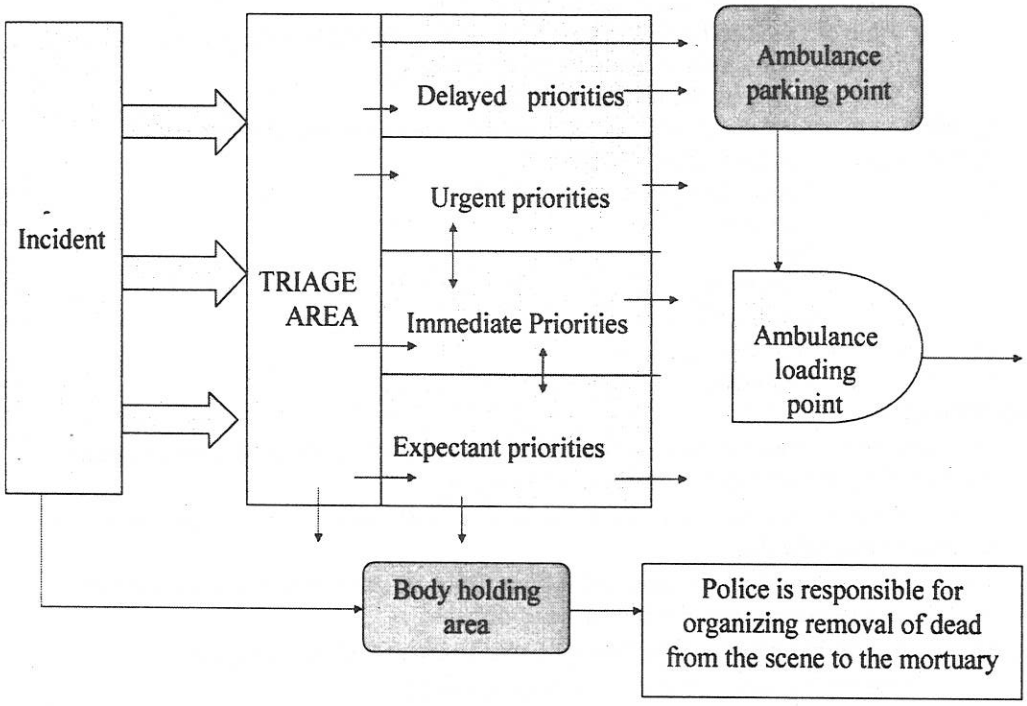
- PROVIDE DEFINITIVE TREATMENT
- PROMOTE RECONSTRUCTION of lives of the victims.

Duties of physician at site/ Transport

EVALUATION AND TRIAGE:

- The duty of physician at site/transport in the management of trauma may begin with the call for assistance from first responders at the injury scene.

- Triage the patients at the site of injury are classified into one of the four groups .
  - Dead or expectant – Black Tag
  - Critical or requiring immediate intervention – Red Tag
  - Urgent but without like threatening injury - Yellow Tag
  - Walking wounded - Green/White Tag



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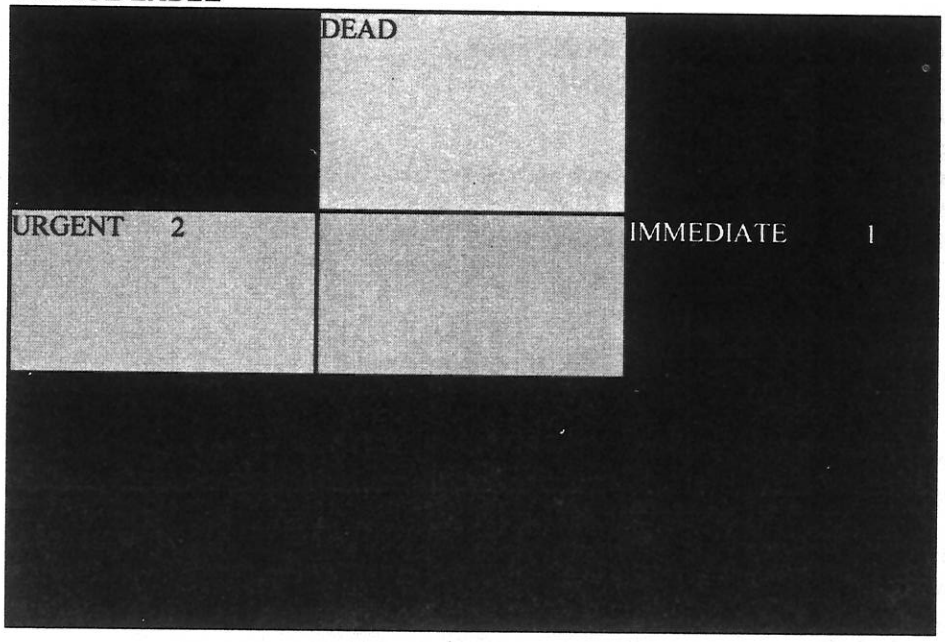


Fundamental to all triages is the concept of allocation of limited resources. As rule, triage precedence is adopted a nearly in all forms disaster management.

The main aim of treatment at the site is implementing a good first-aid like airway, breathing, circulation, splintage, pain relief and a safe transport.

According to severity of injury the victims are categorized and different color code tags are tagged over the shoulder of the injured before shifting to the place of treatment.

In certain places where victims are entrapped and for extrication aneshtesiologists may have to provide anaesthesia until extrication can be achieved and anaesthesia for amputation, disarticulation of an entrapped limb is also needed.

Problems identified with the past disaster response revolve around timeliness and appropriateness of medical aid care that is supplied within the first 24 hours is most important and aid coming afterwards can do little to save life or limit disability especially in the case of earthquakes in which trapped victims must be freed and treated rapidly to avoid morbidity and death.

The key to the pre hospital management is organizing knowledge and skills involved in to a sound strategy for dealing multi system trauma patients in a systematic rapid and thorough ways

Indication for transfer to advanced centre

- No spontaneous eye opening.
- Abnormal capillary refill
- Penetrating cranial, neck, chest/abdominal injuries
- Blunt thracic trauma with SBP <90 mm Hg

- Blunt thracic trauma with SBP <90 mm Hg
- Flail Chest
- Pedestrian sustaining blunt abdominal trauma
- Motorcyclist sustaining blunt injuries.
- Fall> 15 feet.
- Age <5 years and over 65 years.

Salient Features of "Scoop & Run" approach and "Stabalize at Site" approach for transfer of trauma victims.

- Indications * Minimal expected lag time for transfer to a trauma care facility
  OR
  * Lack of equipment and / or trained personnel at site
- Mostly provided by "first contact" bystaneder/witness of event.
- Basic Trauma Life Support (BTLS) : May or may not be provided.
- Advanced Trauma Life Support (ATLS) : Usually not initiated
- Level of training of personnel attending : Variable
- Lag time involved : Minimal
- Risk of life Threatening complications : High, and may go undetected especially in untrained hands.
- Continuity of care and use of Communications network : Not always possible

"Stabilize at site" approach

Indications * Prolonged expected lag time for transfer to a trauma care facility
OR
* Well equipped and trained personnel available at **site.**

* Care provided by 'trained' personnel
* B.T.L.S. : Immediately provided
* A.T.L.S. : May be initiated
* Lag Time : May be prolonged
* Risk of life : Less
* Continuity of care : Better maintained

Primary survey for critical events requiring immediate intervention

- Look for any obvious life threatening injury
- Airway maintenance (airway patency + airway protection)
  - Feels for air movement
  - Look for chest wall movements and evidence of tracheal tug / retraction
  - Listen for any stridor

Primary survey for critical events requiring immediate intervention

- **Breathing**
  - Count the respiratory rate
  - Exclude flail chest, pneumothorax, hemo pneumothorax, open chest wounds
  - Provide IPPV if hypoventilation/clinical hypoxia
- **Circulation**
  - Check carotid and femoral pulses
  - Institute CPR if indicated
  - Correct hypovolemia by instituting wide bore I.V. catheter and infusing ringer lactate
  - Compression/tourniquet for bleeding vessel(s)
- **Cervical spine**
  - Provide spine support (especially in patients who are unconscious or suspicion of cervical trauma)
- Determine neurological status (Glasgow Coma Scale)

Primary Survey for Critical Events

- Evaluate the three S- Safety, Scene and Situation
- Rapidly assess the patients Systemic condition, perform the rapid ABC and cervical spine survey focusing on ventilation, shock and hemorrhage control and neurological status and consciousness level.
- Provide interventions for these problems as the situation may be

Primary Survey for Critical Events

- Reassess the vital functions to evaluate the effectiveness of intervention
- Reassess the head, chest and abdomen to locate potentially life threatening conditions Immobilize patients and expedite transport to the closest appropriate facility
- Perform a rapid secondary survey and provide additional management while on route to the hospital.

BASIC LIFE SUPPORT

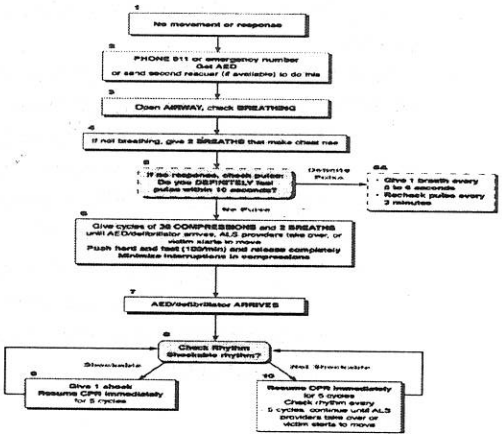
- Basic life support (BLS) includes recognition of signs of sudden cardiac arrest (SCA), heart attack, stroke, and foreign-body airway obstruction (FBAO); cardiopulmonary resuscitation (CPR); and defibrillation with an automated external defibrillator (AED).
- The American Heart Association uses 4 links in a chain (the "Chain of Survival") to illustrate the important time sensitive actions for victims of VF SCA. These links are-
  - Early recognition of the emergency and activation of the emergency medical services or local emergency response system: "phone 911.
  - Early bystander CPR: immediate CPR can double or triple the victim's chance of survival from VF SCA.
  - Early delivery of a shock with a defibrillator: CPR plus defibrillation within 3 to 5 min. of collapse can produce survival rates as high as 49% to 75%.
  - Early advanced life support followed by postresuscitation care delivered by healthcare providers.

ADULT CHAIN OF SURVIVAL

CARDIOPULMONARY RESUSCITATION (CPR)

- Victims of cardiac arrest need immediate CPR. CPR provides a small but critical amount of blood flow to the heart and brain.
- CPR prolongs the time VF is present and increases the likelihood that a shock will terminate VF (defibrillate the heart) and allow the heart to resume an effective rhythm and systemic perfusion.
- CPR is especially important if a shock is not delivered for 4 or more minutes after collapse.
- For every minute without CPR, survival from witnessed VF SCA decreases 7% to 10%. When bystander CPR is provided, the decrease in survival is more gradual and averages 3% to 4% per minute from collapse to defibrillation. CPR has been shown to double or triple survival from witnessed SCA at many intervals to defibrillation.

Adult BLS Healthcare Provider Algorithm. Boxes bordered with dotted lines indicate actions or steps performed by the healthcare provider but not the lay rescuer.



RESCUE BREATHS

- Give 2 rescue breaths, each over 1 second, with enough volume to produce visible chest rise.
- The following general recommendations can be made:

1. During the first minutes of VF SCA, rescue breaths are probably not as important as chest compressions because the oxygen level in the blood remains high for the first several minutes after cardiac arrest. In early cardiac arrest, myocardial and cerebral oxygen delivery is limited more by the diminished blood flow (cardiac output) than a lack of oxygen in the blood. During CPR blood flow is provided by chest compressions. Rescuers must be sure to provide effective chest compressions (see below) and minimize any interruption of chest compressions.

Both ventilations and compressions are important for victims of prolonged VF SCA, when oxygen in the blood is utilized. Ventilations and compressions are also important for victims of asphyxial arrest, such as children and drowning victims who are hypoxemic at the time of cardiac arrest.

3.During CPR blood flow to the lungs is substantially reduced, so an adequate ventilation-perfusion ratio can be maintained with lower tidal volumes and respiratory rates than normal. Rescuers should not provide hyperventilation (too many breaths or too large a volume). Excessive ventilation is unnecessary and is harmful because it increases intrathoracic pressure, decreases venous return to the heart, and diminishes cardiac output and survival.

4.Avoid delivering breaths that are too large or too forceful. Such breaths are not needed and may cause gastric inflation and its resultant complications.

- When an advanced airway (ie, endotracheal tube, Combitube, or LMA) is in place during 2-person CPR, ventilate at a rate of 8 to 10 breaths per minute without attempting to synchronize breaths between compressions. There should be no pause in chest compressions for delivery of ventilations (Class IIa).

- Studies in anesthetized adults (with normal perfusion) suggest that a tidal volume of 8 to 10 mL/kg maintains normal oxygenation and elimination of CO2. During CPR cardiac output is 25% to 33% of normal, so oxygen uptake from the lungs and CO2 delivery to the lungs are also reduced. As a result, low minute ventilation (lower than normal tidal volume and respiratory rate) can maintain effective oxygenation and ventilation during CPR. During adult CPR tidal volumes of approximately 500 to 600 mL (6 to 7 mL/kg) should suffice (Class IIa).

TYPES OF RESCUE BREATHING

- Mouth-to-Mouth Rescue Breathing
- Mouth-to–Barrier Device Breathing
- Mouth-to-Nose and Mouth-to-Stoma Ventilation
- Ventilation With Bag and Mask
  - Rescuers can provide bag-mask ventilation with room air or oxygen. A bag-mask device provides positive-pressure ventilation without an advanced airway and therefore may produce gastric inflation and its complications. When using a bag-mask device, deliver each breath over a period of 1 second and provide sufficient tidal volume to cause visible chest rise.

- This volume can be delivered by squeezing a 1-L adult bag about one half to two thirds of its volume or a 2-L adult bag about one-third its volume.
- The rescuer delivers the breaths during pauses in compressions and delivers each breath over 1 second
- The healthcare provider should use supplementary oxygen (O2 40%, a minimum flow rate of 10 to 12 L/min) when available. Ideally the bag should be attached to an oxygen reservoir to enable delivery of 100% oxygen.

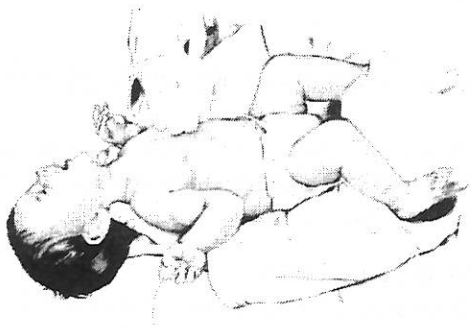
- Ventilation With an Advanced Airway (Endotracheal tube, LMA)
- Cricoid Pressure
  - Pressure applied to the victim's cricoid cartilage pushes the trachea posteriorly, compresses the esophagus against the cervical vertebrae, and can prevent gastric inflation and reduce the risk of regurgitation and aspiration. Application of cricoid pressure usually requires a third rescuer, one who is not responsible for chest compressions or ventilations. Cricoid pressure should be used only if the victim is deeply unconscious (ie, has no cough or gag reflex).
- The compression rate refers to the speed of compressions, not the actual number of compressions delivered per minute.

- Survival rates were better with chest compressions only than with no CPR but were best with compressions and ventilation settings with lay rescuer AED programs (AED on-site and available) and for in-hospital environments or if the EMS

Summary of BLS ABCD Maneuvers for Infants, Children, and Adults (Newborn Information Not Included)

Maneuver	Adult Lay rescuer: ≥8 years HCP: Adolescent and older	Child Lay rescuers: 1 to 8 years HCP: 1 year to adolescent	Infant Under 1 year of age
Airway	Head tilt–chin lift (HCP: suspected trauma, use jaw thrust)		
Breathing Initial	2 breaths at 1 second/breath	2 effective breaths at 1 second/breath	
HCP: Rescue breathing without chest compressions	10 to 12 breaths/min (approximate)	12 to 20 breaths/min (approximate)	
HCP: Rescue breaths for CPR with advanced airway	8 to 10 breaths/min (approximately)		
Foreign-body airway obstruction	Abdominal thrusts		Back slaps and chest thr
Circulation HCP: Pulse check (≤10 sec)	Carotid		Brachial or femoral
Compression landmarks	Lower half of sternum, between nipples		Just below nipple line (lo half of sternum)
Compression method Push hard and fast Allow complete recoil	Heel of one hand, other hand on top	Heel of one hand or as for adults	2 or 3 fingers HCP (2 rescuers): 2 thumb–encircling han
Compression depth	1½ to 2 inches	Approximately one third to one half the depth of the chest	
Compression rate	Approximately 100/min		
Compression-ventilation ratio	30:2 (one or two rescuers)	30:2 (single rescuer) HCP: 15:2 (2 rescuers)	
Defibrillation AED	Use adult pads Do not use child pads	Use AED after 5 cycles of CPR (out of hospital). Use pediatric system for child 1 to 8 years if available **HCP: For sudden collapse (out of hospital) or in-hospital arrest use AED as soon as available.**	No recommendation fo infants <1 year of age

Note: Maneuvers used by only Healthcare Providers are indicated by "HCP."



Two thumb–encircling hands chest compression in infant (2 rescuers).

Two-finger chest compression technique in infant (1 rescuer).

DEFIBRILLATION PLUS CPR:

A Critical Combination

- Early defibrillation is critical to survival from sudden cardiac arrest (SCA) for several reasons: (1) the most frequent initial rhythm in witnessed SCA is ventricular fibrillation (VF), (2) the treatment for VF is electrical defibrillation, (3) the probability of successful defibrillation diminishes rapidly over time, and (4) VF tends to deteriorate to asystole within a few minutes.

DEFIBRILLATION PLUS CPR:

A Critical Combination

- If bystanders provide immediate CPR, many adults in VF can survive with intact neurologic function, especially if defibrillation is performed within about 5 minutes after SCA. CPR prolongs VF (ie, the window of time during which defibrillation can occur) and provides a small amount of blood flow that may maintain some oxygen and substrate delivery to the heart and brain. Basic CPR alone, however, is unlikely to eliminate VF and restore a perfusing rhythm.

SHOCK FIRST VERSUS CPR FIRST

- EMS system provides 5 cycles of CPR before defibrillation of patients in VF, particularly when the call to response interval in more than 4-5 minutes.

1- SHOCK PROTOCOL VERSUS 3-SHOCK SEQUENCE

- When VF/pulseless ventricular tachycardia (VT) is present, the rescuer should deliver 1 shock and should then immediately resume CPR, beginning with chest compressions (Class IIa). The rescuer should not delay resumption of chest compressions to recheck the rhythm or pulse. After 5 cycles (about 2 minutes) of

CPR, the AED should then analyze the cardiac rhythm and deliver another shock if indicated (Class IIb).

SHOCK FIRST VERSUS CPR FIRST

- First-shock efficacy for monophasic shocks is lower than first-shock efficacy for biphasic shocks.
- Analyses of VF waveform characteristics predictive of shock success have documented that the shorter the time between a chest compression and delivery of a shock, the more likely the shock will be successful.

DEFIBRILLATION WAVEFORMS AND ENERGY LEVELS

- Defibrillation (shock success) is typically defined as termination of VF for at least 5 seconds following the shock. VF frequently recurs after successful shocks, but this recurrence should not be equated with shock failure.
- Defibrillation with biphasic waveforms of relatively low energy (200 J) is safe and has equivalent or higher efficacy for termination of VF than monophasic waveform shocks of equivalent or higher energy. It monophasic defibrillation is used : select dose of 360 J for all shocks

ELECTRODE PLACEMENT

- Rescuers should place AED electrode pads on the victim's bare chest in the conventional sternal-apical (anterolateral) position. The right (sternal) chest pad is placed on the victim's right superior-anterior (infraclavicular) chest and the apical (left) pad is placed on the victim's inferior-lateral left chest, lateral to the left breast. Other acceptable pad positions are placement on the lateral chest wall on the right and left sides (biaxillary) or the left pad in the standard apical position and the other pad on the right or left upper back.

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Oropharyngeal Airways

- Oropharyngeal airways should be reserved for use in unconscious (unresponsive) patients with no cough or gag reflex and should be inserted only by persons trained in their use. Incorrect insertion of an airway can displace the tongue into the hypopharynx, causing airway obstruction.

Nasopharyngeal Airways

- Nasopharyngeal airways are useful in patients with airway obstruction or those at risk for development of airway obstruction, particularly when conditions such as a clenched jaw prevent placement of an oral airway.

Advanced Airways

- Rescuers must be aware of the risks and benefits of insertion of an advanced airway during a resuscitation attempt. Rescuers may defer insertion of an advanced airway

until the patient fails to respond to initial CPR and defibrillation attempts or demonstrates return of spontaneous circulation.

ESOPHAGEAL-TRACHEAL COMBITUBE

- Ventilation and oxygenation with the Combitube compare favorably with those achieved with the endotracheal tube.
- Fatal complications may occur with use of the Combitube if the position of the distal lumen of the Combitube in the esophagus or trachea is identified incorrectly. For this reason confirmation of tube placement is essential. Other possible complications related to the use of the Combitube are esophageal trauma, including lacerations, bruising, and subcutaneous emphysema.

LARYNGEAL MASK AIRWAY

- Training in the placement and use of an LMA is simpler than that for endotracheal intubation because insertion of the LMA does not require laryngoscopy and visualization of the vocal cords. The LMA may also have advantages over the endotracheal tube when access to the patient is limited, there is a possibility of unstable neck injury, or appropriate positioning of the patient for endotracheal intubation is impossible.

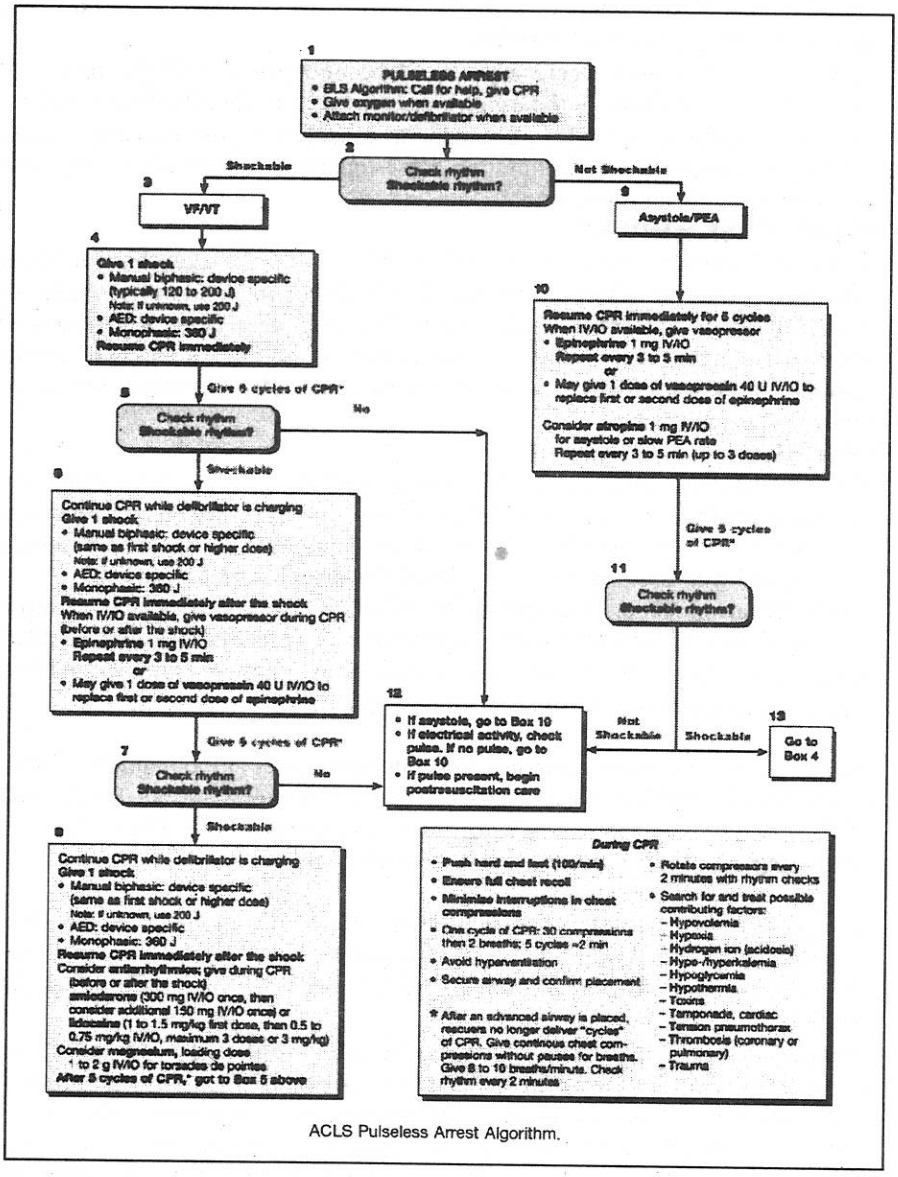
ENDOTRACHEAL INTUBATION

- The endotracheal tube keeps the airway patent, permits suctioning of airway secretions, enables delivery of a high concentration of oxygen, provides an alternative route for the administration of some drugs, facilitates delivery of a selected tidal volume, and with use of a cuff may protect the airway from aspiration.
- Endotracheal intubation attempts by unskilled providers can produce complications, such as trauma to the oropharynx, interruption of compressions and ventilations for unacceptably long periods, and hypoxemia from prolonged intubation attempts or failure to recognize tube misplacement or displacement.

- Indications for emergency endotracheal intubation are (1) the inability of the rescuer to adequately ventilate the unconscious patient with a bag and mask and (2) the absence of airway protective reflexes (coma or cardiac arrest). The rescuer must have appropriate training and experience in endotracheal intubation

- During CPR we recommend that rescuers minimize the number and duration of interruptions in chest compressions, with a goal to limit interruptions to no more than 10 seconds except as needed for interventions such as placement of an advanced airway.
- Interruptions needed for intubation can be minimized if the intubating rescuer is prepared to begin the intubation attempt (ie, insert the laryngoscope blade with the tube ready at hand) as soon as the compressing rescuer pauses compressions.
- There is no need to clear the airway of aspirated water, because only a modest amount of water is aspirated by the majority of drowning victims and it is rapidly absorbed into the central circulation, so it does not act as an obstruction in the trachea.

- Attempts to remove water from the breathing passages by any means other than suction (eg, abdominal thrusts or the Heimlich maneuver) are unnecessary and potentially dangerous.



ACLS Pulseless Arrest Algorithm.

- 5 clinical signs that were found to strongly predict death or poor neurologic outcome, with 4 of the 5 predictors detectable at 24 hours after resuscitation:
  - Absent corneal reflex at 24 hours

- Absent pupillary response at 24 hours
- Absent withdrawal response to pain at 24 hours
- No motor response at 24 hours
- No motor response at 72 hours

RECUSCITATION IS SPECIAL CIRCUMSTANCES

DROWNING

- Drowning is a leading preventable cause of unintentional morbidity and mortality.
- The most important and detrimental consequence of submersion is hypoxia. Therefore, oxygenation, ventilation, and perfusion should be restored as rapidly as possible. This will require immediate bystander CPR plus immediate activation of the emergency medical services (EMS) system.
- The most important factors that determine outcome of drowning are the duration and severity of the hypoxia.

MODIFICATIONS TO BASIC LIFE SUPPORT FOR DROWNING

RESCUE BREATHING

- The first and most important treatment of the drowning victim is the immediate provision of ventilation. Prompt initiation of rescue breathing increases the victim's chance of survival.
- Management of the drowning victim's airway and breathing is similar to that recommended for any victim of cardiopulmonary arrest.

MODIFICATIONS TO BASIC LIFE SUPPORT FOR DROWNING

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ACLS FOR CARDIAC ARREST ASSOCIATED WITH TRAUMA

AIRWAY

- Indications for immediate intubation of the trauma patient include
  - Respiratory arrest or apnea
  - Respiratory failure, including severe hypoventilation or hypoxemia despite oxygen therapy

ACLS FOR CARDIAC ARREST ASSOCIATED WITH TRAUMA

- Severe head injury (eg, Glasgow Coma Scale score [GCS] <8)
- Inability to protect the upper airway (eg, loss of gag reflex, depressed level of consciousness)
- Thoracic injuries (eg, flail chest, pulmonary contusion, penetrating trauma)
- Injuries associated with potential airway obstruction (eg, crushing facial or neck injuries)

Endotracheal intubation is performed while maintaining cervical spine stabilization. Generally orotracheal intubation is performed. Avoid nasotracheal intubation in the presence of severe maxillofacial injuries.

- Unsuccessful endotracheal intubation for the patient with massive facial injury and edema is an indication for cricothyrotomy by experienced providers.
- When an endotracheal tube or other advanced airway is in place during CPR, simultaneous ventilations and compressions may result in a tension pneumothorax in an already damaged lung, especially if fractured ribs or a fractured sternum is present. Providers should suspect the development of a tension pneumothorax if there is a decrease in chest expansion and breath sounds, increased resistance to hand (bag-tube) ventilation, or if the patient's oxygen saturation falls.

CIRCULATION

- Aggressive fluid resuscitation is not required for trauma patients who have no evidence of hemodynamic compromise.
- A high rate of volume infusion with the therapeutic goal of a systolic blood pressure <100 mm Hg is now recommended only for patients with isolated head or extremity trauma, either blunt or penetrating.
- In the urban setting, aggressive prehospital volume resuscitation for penetrating trauma is no longer recommended because it is likely to increase blood pressure and consequently accelerate the rate of blood loss, delay arrival at the trauma center, and delay surgical intervention to repair or ligate bleeding vessels.
- In rural settings, transport times to trauma centers will be longer, so volume resuscitation for blunt or penetrating trauma is provided during transport to maintain a systolic blood pressure of 90 mm Hg.

CARDIAC ARREST ASSOCIATED WITH PREGNANCY

- During attempted resuscitation of a pregnant woman, providers have two potential patients, the mother and the fetus. The best hope of fetal survival is maternal survival. For the critically ill patient who is pregnant, rescuers must provide appropriate **resuscitation, with consideration of the physiologic changes due to pregnancy.**

KEY INTERVENTIONS TO PREVENT ARREST

- To treat the critically ill pregnant patient:
  - Place the patient in the left lateral position.
  - Give 100% oxygen.
  - Establish intravenous (IV) access and give a fluid bolus.
  - Consider reversible causes of cardiac arrest and identify any preexisting medical conditions that may be complicating the resuscitation.

CONSIDER FEATURES OF THE CARDIAC ARREST

- The following features of the cardiac arrest can increase the infant's chance for survival:
  - Short interval between the mother's arrest and the infant's delivery
  - No sustained prearrest hypoxia in the mother
  - Minimal or no signs of fetal distress before the mother's cardiac arrest
  - Aggressive and effective resuscitative efforts for the mother
  - The hysterotomy is performed in a medical center with a neonatal intensive care unit

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