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MANAGEMENT OF LIVER ABSCESSES BY PERCUTANEOUS CATHETER DRAINAGE

DR. SHARADENDU BALI* AND RAJIV KHURANA**

Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Sharadendu Bali and Rajiv Khurana* the authors of the research paper entitled MANAGEMENT OF LIVER ABSCESSES BY PERCUTANEOUS CATHETER DRAINAGE declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else.We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

Over a period of one year,50 patients with liver abscesses underwent ultrasound guided pigtail catheter drainage – 42 had single large abscess while 8 had multiple abscesses.Pigtail catheters of sizes 10F to 18F were used, introduced either directly or after dilatation using Seldinger technique. The volume of pus drained averaged from 80-2400ml, while the period of catheter drainage ranged from 7 to 24 days. Complications were minimal in form of catheter blockage, and there was no mortality. This study shows a success rate of 88%,going up to 96%, confirming that indwelling catheter drainage offers the safest and best modality in the management of large unruptured liver abscesses.

Introduction

Patients with liver abscesses continue to present in large numbers in surgical clinics.Widespread availability of diagnostic ultrasound has made the diagnosis of liver abscesses faster and reliable. Availability of USG guided procedures has also made the aspiration and insertion of indwelling catheters into the abscess cavities easier and safer. Although medical treatment is the primary mode of managing small abscesses, larger abscesses require drainage[1,2]. Percutaneous drainage using pig-tail catheters is now considered the treatment of choice for most intra-abdominal abscesses and fluid collections[3].

The present study evaluates ultrasound guided pigtail catheter drainage in a series of fifty cases of liver abscess. The study assesses the response to the procedure, as well as evaluates the morbidity, mortality and complication rate of the drainage procedure.

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Materials and Methods

This study was carried out on patients admitted in Maharishi Markandeshwar Institute of Medical Sciences, Mullana over a period of one year from December 2013 to Dec.2014. Patients with liver abscess larger than 5cm, were selected for the study. Of these, 42 were males and 6 were females. Diagnosis of liver abscess was made on the basis of history and clinical examination followed by USG. CT scan was not routinely carried out. Abdominal pain (n=49) and fever (n=46) were the commonest symptoms, while jaundice with raised liver enzymes were found in 6 cases.

Haematological investigations, renal function tests, triple antigen(HbsAg, HIV and HCV), LFT, alongwith bleeding time, clotting time and prothrombin time were performed in all the patients. Elevated TLC(white blood cell count greater than 10,000/cumm)was found in 18 patients. BT, CT and PT were found to be within normal limits,while 4 patients were found to be HbsAg positive. All patients were negative for HIV and HCV.

USG showed involvement of right lobe in 42, left lobe in 2 and involvement of both lobes in 6 cases. All abscesses were larger than 5cm. in size. Serological tests for amoebic infestation were not performed due to their unavailability in our hospital. USG was repeated after intervals of 3-5 days till the abscesses were found to be resolved or not growing further in size (after drainage had ceased). Review USG was carried out 2-3 weeks after removal of catheter.

Technique

Pigtail catheters of size 10F to 18F of Devon Innovations were used. In easily accessible locations where the abscess was not deep inside the liver, a simple Devon" Percutaneous Pigtail Suprapubic Catheter Set"of size 10-12F was used. This entails no use of serial dilators. After insertion , the pigtail catheter was fixed to skin with silk 2/0, and a small dressing applied.The catheter was connected to a closed drainage bag and the pus sent for culture/sensitivity. In cases where there were multiple abscesses, the catheter was inserted into the largest abscess.

In deeper seated abscesses, and where the pus was thought to be thicker, catheter drainage was carried out using the Seldinger technique[4], under ultrasonic guidance using all aseptic measures. For this, Devon " Percutaneous Pigtail Nephrostomy Catheter Set" was used. This is worth around Rs.3000, which is almost three times the cost of the simple pigtail mentioned above. A safe route for insertion of the catheter was determined by the sonologist, avoiding bowel as well as major vessels. The site so determined was marked and infiltrated by 2% lignocaine. A 3-4mm stab incision was made through which a guide wire introducer needle was passed under sonological control till it reached the center of the abscess cavity. A guide wire was then introduced through the needle and positioned inside the cavity following which the needle was removed keeping the guide wire in situ. Serial dilators were then passed over the wire to dilate the tract, which was carried out till the size was considered adequate to drain the pus. After adequate dilatation of the tract, the dilator was replaced by pigtail catheter which was positioned in the center of the abscess. Guide wire was then withdrawn and catheter fixed in place.

The usual antibiotic regime administered was Inj. Ceftriaxone 1gm.BD, Inj.Amikacin 500mg.BD and Inj.Metronidazole 100ml. TDS. Injectables were discontinued after 5-8 days and thereafter oral antibiotics were continued, usually Oflox TZ twice a day for another 2-3 weeks. In very large and multiple abscesses(which yielded anchovy sauce coloured pus), double dose Metronidazole was given[5]. Drain bags were emptied daily and the volume of pus drained recorded . Where there were multiple

abscesses, the others(pigtail having been placed into the largest) larger than 2-3cm. were aspirated with spinal needle no.18 under USG guidance.

Patients were usually given fluids orally on the first day, and were started on semi solid diet on second day. Clinical condition was assessed daily and repeat investigations sent where required. Antibiotics were modified as per the C/S reports..USG was usually repeated every 3-4 days, or at the time of aspirating the other abscesses. The pigtail catheters were considered for removal when the drainage became minimal(less than 10ml) and USG showed reduced size or collapsed cavity. After removal of catheter, small sterile dressing was applied and patient discharged on oral antibiotics. Review USG was done after one week to ten days, and then the patients were called for monthly follow up.

Results

Fifty patients with liver abscess more than 5cm. were included in this study. While 42 had single abscess, 8 patients had multiple abscesses. In two patients the abscess had ruptured into the peritoneal cavity while in one case the large abscess had ruptured through the diaphragm into the chest creating a large pulmonary abscess and lung collapse. Most of the abscesses were showing liquefied pus at initial USG examination(n=47), while in 3 cases ultrasonography was suggestive of phlegmon. The size of the abscesses ranged from 5cm to 14cm in the greatest diameter. Pleural effusion was present on the right side in two cases.

Catheter drainage achieved good symptomatic relief in all the patients within 2-3 days, while the leukocytosis came back to normal within 4 to 8 days. The raised serum bilirubin in 6 cases having associated jaundice became normal in 7-10 days.There were no special problems associated with the HBsAG positive cases. The patient with concurrent lung abscess recovered with repeated aspiration of pus(thrice) from the lung lesion.

The duration of catheter placement was 7 to 24 days with an average of 12 days. The total amount of pus drained from the abscess cavities ranged from 80 to 2400 ml, with an average of 664 ml. In the patients in which there were multiple liver abscesses, the other abscesses(apart from the one in which pigtail was inserted) were aspirated with no.18 spinal needle for a maximum of three times. Culture/ sensitivity was positive in 6 cases and showed Streptococcus in two and Klebsiella in four cases.

There were hardly any complications encountered with the procedure. Catheter blockage occurred in 6 cases and this was resolved by irrigating/flushing with saline. There was no mortality associated with the procedure. In the two cases where intra-peritoneal rupture of abscess had already occurred at time of insertion of pigtail, the deteriorating general condition mandated laparotomy, and both the cases recovered after the operation. The one with intra-thoracic rupture resolved without open surgery. In this series, 44 patients were treated successfully ,two underwent laparotomy, and another four could not be followed up due to non-reporting after removal of catheter. But these four had responded favourably to the procedure.Based on these numbers, it can be safely deduced that the success rate was 88-96% (44-48 out of 50). This is comparable to other series.

Discussion

Percutaneous treatment of liver abscesses has replaced exploratory laparotomy as the treatment of choice for unruptured abscesses[6,7,8]. Needle aspiration is an alternative to indwelling catheter drainage, but requires more pricks with thick-gauge needle and availability of ultrasonologist at each sitting(leading to delay). This is more painful and distressing for the patient, and can lead to more cases being lost to

follow up. Insertion of pigtail catheter at the first instance is less uncomfortable for the patient, and leads to better compliance as the number of pricks is less(required in those cases with multiple abscesses). Success rate is therefore higher.

Previous studies with lower success rates were probably due to thick pus which blocked the catheters and did not adequately drain[3,8] through the narrower catheters. This problem has been circumvented in the present study by use of wider bore catheter placed with the help of nephrostomy sets using Seldinger technique.Though these sets are more expensive(Rs.3200 as compared to Rs.1200 for simple pigtail sets), the procedure takes only a little more time(around 10 mins extra), and the results are far more satisfactory and safety is also not compromised.

Though the diagnosis of amoebic or pyogenic liver abscesses could not be confirmed, the results were equally satisfactory in cases of multiple abscesses. The antibiotic regime covered gram positive, gram negative as well as anaerobes and was probably the reason for success in all cases. Needless to say, a careful search was made before inserting the catheters to determine if the abscesses were pyaemic, and catheters were placed only if no such information was forthcoming.

To summarize, percutaneous indwelling catheter drainage is a safe and effective treatment modality for liver abscesses. It avoids the complications associated with laparotomy[9], and the delay/ non-compliance associated with repeated aspirations.The low morbidity and high success rate in treating unruptured liver abscesses by this minimally invasive technique, makes a strong case for this being the first line of management in liquefied moderate to large sized liver abscesses[5].

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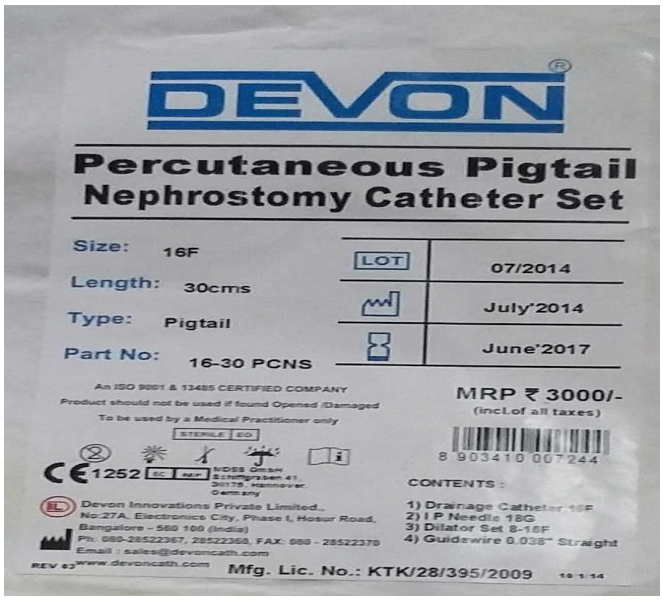
IMAGES : As Below

The plain pigtail catheter inserted by mounting onto introducer Needle



The Devon Nephrostomy set which is comprised of four components.

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A CONCEPTUAL STUDY ON RASAYANA

Dr. Dinesh Kr. Meena* AND Dr. Rani Singh**

Declaration

Abstract

Rasayanais therapeuticprocedure used to rejuvenate structural, functional and spiritual entities ofhuman being.Literally,Rasayana means the augmentation of the quantities quality of rasa, the vital fluid produced at end of the digestion of food. The aim of Rasayana is not only to improve the quality of rasa but also help in overall personality development. It isa specialized branch of Ayurveda for preventing the effect of ageing and to improve memory, intelligence, and complexion, sensory and motor function.Ayurveda has described many type ofRasayana, which can provide protection against toxic substances and diseases. They promote physical health, improve the status of the dhatu(tissue), confer immunity and rejuvenate the entire systemof body.

Keywords: Dosa, dhatu, Agni, mala, Indriya, manas, kamya, ajasrika, medha

Introduction

Ayurveda is "Science of life". It`s first and foremost aim is to preserve the good health and to prolong the life. Thesecond aim is to prevent the disease[1].According to Ayurveda the healthy man is he who has equilibrium of three *Dosha*, *Agni*, *Dhathu,*and *Mala*and is a state where the *Atma*(soul), *Indriya*(senses) and *Mana*(mind) are pleasant and joyful[2].The one who has no physical or mental disease, feels young and has physical strength, energy and right capacity to achieve his goals, who has got sufficient knowledge, scientific view point and strong physique and sense organs[3]. Ayurveda has eight branches; *Rasayana*One of them. Ayurveda regards that Ramayana is almost necessary and most important for

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every one of us to avoid disorders and old age problems and to lead a happy, healthy and prolong life. The aim of the study is to create the awareness of public onimportance of *Rasayana for* individuals development which help in the development of a family, society and the nation as whole towardsnational health.

Material and Methods

Collection, exploration, systematization and interpretation of related subject matter from authentic Ayurvedic texts.

Etymology of Rasayana; Rasayana, is a Sanskrit word made of two words "*Rasa*" and "*Ayana*", with literal meaning: *Path* (A*yana*) *of essence* (R*asa*) which refers to nutrition & its transportation in body[4].

Classification of Rasayanacategaries

it can be divided into three:

1. *KamyaRasayana* (Promoter of general health and longevity),
2. *NaimittikaRasayana* (Disease specific *Rasayana*) and
3. *AjasrikaRasayana* (*Rasayanato* usewithdaily routine).

KamyaRasayana

Again can be classified into threecategory:

1. *Pranakamya*(Promoter of vitality and longevity of life),
2. *Medhakamya*(Promoter of intellect)
3. *Shrikamya*(Promoter of complexion and luster)[5].

Classification

"On the basis of diet and life style"

1. *AharaRasayana*(through diet)
2. *AushdhaRasayana(*through drugs),
3. *AcharaRasayana*(through good conduct)[6].

Mechanism of action Rasayana

The word Rasayana is made by two words 'rasa' and 'ayan'. The word Rasa has so many meanings in Ayurvedic literature, but here the word rasa means the nourishing fluid product produced after digestion of food and gets mixed with plasma after absorption. Ayan means movement or circulation. So the word 'Rasayana' means the circulation of nutritive substances to different body tissue (dhatu) for nourishing them and obtaining good quality of all tissues.As the Ayurvedic drugs acts by different qualities, as some act by their rasa some by gunas, some by virya (potency of drugs), some by vipak, and some by prabhav. The Rasayana drugs also act in similar way at the following levels.

- At the level of 'rasa'. Some drugs like 'Shatavari' 'dugdh' 'grith' etc. They increase the nutrient quality and quantity of the rasa and directly improve the tissue nourishment showing their rasayana effect.

- At the level of ‘agni‘. Some drugs like ‘bhallatak‘ and ‘ pippali‘ they act at the level of ‘dhatvagni‘ and ‘bhutagni‘ by increasing metabolic activities of different ‘dhatus‘.
- At the level of ‘srotas‘.Some drugs like ‘guggul‘ they act at the level of ‘srotas‘ by increasing microcirculation and tissue perfusion. The other reason for this type of action of rasayana drugs is that most of them are treated with ghrith (ghee) or oil which increased the permeability of cellular membrane as it is formed by different types of fat.
- The AcharRasayan act at the level of psyche (manas)[7]

Indications of Rasayana Chikitsa; A person who wishes to take Rasayana therapy should have a determind mind, should have faith in the therapy, should have proper concentration of mind, shouldfree from evil deeds and should have sympathy, love and kindness towards all creatures.

*Contraindications of RasayanaChikitsa; Rasayana Chikithsa*is contraindicated for people, who are unhealthy mind and body and who easily gets Anger, jealacy,different temptations etc.

Procedure of Rasayana Chikitsa

Depending on the methods of RasayanaChikitsa, It is divided into two:

a.) KutiPraveshikaRasayana; ‘Kuti‘ means ‘Hut‘ and ‘Pravesha‘ means ‘Entrance‘. KutipraveshikaRasayana means Rasayana therapy taken by, all the time staying in a special Hut.This method of Rasayana therapy is rather difficult to be followed by a common man. Hence KutipraveshikaRasayana method is a rarely followed uncommon method.

b.) VatatapikaRasayana; Vata means Atmosphere and Atapa means Heat from sun rays. Hence Vatatapika means under normal exposure to sun and Atmosphere. This Vatatapika method is suggested for Rasayana therapy for any common man living in normal conditions and can be taken easily during his normal daily routine.Hence this is a popularly followed, common method for Rasayana therapy[8].

Kuti Praveshika Rasayana (Indoor Rasayana Therapy)

This method is as follows :

1. Age of the person-Rasayana should be used by the wise physician in young or middle age invariably after prior unction and evacuation[9]. Usually this Rasayana therapy method should be adopted in the young age before 25 years of age or at the middle age before 50 years of age.
2. Procedure-For kutipraveshikaRasayana therapy a special hut must be prepared.

(a) Situation of the hut; The special hut should be built on clean, calm and quiet place of the east or west direction of a town where good doctors and nice people live, there is no fear of wild beasts or bad people and all the necessary material for Rasayana therapy can be easily available.

(b) Construction of the hut; The hut should be specially constructed with three coats around the innermost spacious room with toilet and bathroom. All the walls should have holes instead of windows so that sun-light, Air, dust, etc. should not directly enter into that special hut. This hut should be prohibited for all people except the concerned doctor. The doctor should see beforehand that the hut is built as per directions and contains all necessary equipments and materials.

(c) Entrance; The fit person for Rasayana therapy should enter the hut on an auspicious day and time in winter season after praying god and saints. He must be clean shaved, must have faith on the therapy, courage and must be free from all sorts of passions.

(d) Panchakarma; After entrance into the hut, the person should undergo purvakarma, means Snehana (Oleation) and Swedana (Fomentation) before panchakarma therapy.

(i) Snehana- He should get massage all over the body with preferably ghee(liquefied butter extracted from curd) or Seassamum seed oil.

(ii) Swedana- Then he should undergo fomentation with application of hot bricks etc.

(iii)After Snehana, Swedana, he should take only Virechana (Purgation). It is not necessary to undergo all five types of cleansing processes but only purgation is advised as routine[10].

Purgation should be done by taking a mixure of Rock salt (Saindhava), Haritaki (TerminaliaChebula), Amalaki (Embellicaofficinalis), Vacha (Acoruscalamus), Vidanga fruits (Embellicaribes), Haridra (Curcuma longa), Pippali (Piper longum), and Sunthi (Ginger officinalis) mixed with Jaggery (raw sugar) and water[11].

After purgation one should take only ghee (liquefied butter) and soft rice for seven days.

Methods of Rasayna Therapy

Afterwards one should daily take the Rasayana therapy for one month. During this one month he must live in the same innermost dark room of the hut for 24 hours a day.

Types of Procedure

There are different ways of Rasayana therapy in this Kutipraveshika method.But a common and comparatively simple procedure is as follows:

A broad stem of a medicinal tree like Palasha tree (Buteamonosperma) or a nearby available medicinal tree should be cut and a hole of about 60 cmsdepth should be carved within this piece of stem. Then this hole should be filled with fresh fruits of Amalaki (Embellicaofficinalis) and the whole stem should be rapped with natural mud of a river or a pond containing lotus plants. Then the whole stem should be covered with dried cow dung and set on fire so that inside fruits are well cooked. The concerned person must eat only these cooked fruits with ample cow‘s for continuouslymilk daily one month by living only in that hut for all the time[12].

Vatatapika Rasayana (RasayanaTherapy for outdoor patient); Apart from *KutiPraveshikaRasayana*, a person should also be treated with *VatatapikaRasayana*, which is more easier, practicable and affordable than *KutiPraveshikaRasayana*in the present era of society.

Droni Praveshika Rasayana; Droni means a hollow vessel or tub full of decoction of certain medicinal preparations. One has to sit in this medicinal tub for a specific period. But unfortunately detailed description about this method is not found in Ayurvedic texts hence this method is not practiced now days.

Criteria for Selection of RasayanaAushadha(RasayanaDrugs)

Kamya Rasayana (Promoter of general health andlongevity); Under *Kamya Rasayana*, a person may be administeredfollowing:

a.) *PranakamyaRasayana;* The word ‘Kama‘ means Desire.‘Kamya‘ means fulfilments of desire. ThisRasayana has been advocated for healthy individuals desirous to improve their health and vitality.

b.) *MedhakamyaRasayana; MedhakamyaRasayana*is to be used in the various disorders of the nervous system. This Rasayana promote Medha (Buddhi/intellect) and Smruti(memory). Aim of this Rasayana to promote intellect, which includes *Medhya Rasayana*: *Shankhapushpi* (*Convolvulus pluricaulis*), *Guduchi* (*Tinosporacordifolia*), *Madhuyashti* (*Glycyrrhizaglabra*).*Ashvagandha*(*Withaniasomnifera*), *Vacha*(*Acoruscalamus*) and *Jyothishmathi* (*Celastruspaniculata*) have *Medhya*properties.

c.) *Shrikamya Rasayana;* Aim of administration of this *ShrikamyaRasayana*is topromote the complexion and luster of a person. These*Rasayana*drugs are *DivyaAushadhi*(Divine herbs).

*Naimittika Rasayana(Disease specific Rasayana);*The Naimittika means Occasional.According to the disease condition, specific *Rasayana*drug are to be selected for the administration.

BhallatakaRasayana(*Semecarpusanacardium):- KaphajrogaetcKhadiraRasayana (Acacia catechu):- Skin disorderHaritaki*Rasayana(*Terminaliachebula*):-Panduroga (Anemia), Arsh (Piles), Gulm (lump).*PippaliRasayana (Piper longum) :-Shvashroga (Dyspnoea), Kash (Cough), Khaya (Tuberculosis)GambhariRasayana(Gmelinaarborea):- Raktapitta (Haemorrhagic blood disease), PittajrogaNagbalaRasayana(Grewiahirsuta) :- Shvash (asthma)Chyavanaprashavaleha*:- Shvash

(Dyspnoea), Kash (Cough),*MedhyaRasayana :-Unmad, Apasmaretc.Mental disorder ThriphalaRasayana*(Three myrobalans), *:-Udararoga (Abdominal diseases)*[13]

AjasrikaRasayana(Rasayanato use daily routine); AjasrikaRasayana is the nutrition in the form of different dietary regimes which can be taken regularly as food, like milk, ghee etc .Because of the Rasayana properties of these substances people use in their day to day life help them to attain strength of the srotas, organs, and sense organs and impart intelligence and memory. It nourishes the blood, lymph, muscle, tissue, and thus prevents chronic degenerative diseases like arthritis.

AcharaRasayana(Rasayanathrough code of conduct); The AcharaRasayana is a type of non-pharmacological management in which by practicingspecific code of conduct one can get the desired effects of Rasayana.AcharaRasayana makes an individual strong physically, mentally, spriritually, socially and morally by means of codes and conducts[14].*Benefits of Rasayana Therapy*The following effects are sought after regular intake of Rasayana therapy-Long life(Dirghayu), Memory(Smruti), Intellect(Medha), Health(Arogya), Youth(TarunamVayaha), Brilliance(Prabha), Fair complexion(Varna), Good voice(Swara), Generosity(Audarya), Increased physical and mental strength(DehendriyaBalodayam), Effective speaking(Vaksiddhi), Virility(Vrushatam) and Beauty(Kanti) is achieved by the intake of Rasayanas[15].

The effects of some of the Rasayana herbal drugs like Amalaki fruits (Embellicaofficinalis), Haritaki(Terminaliachebula), Guduchi (Tinosporacordifolia), Ashwagandha(Withaniasomnifera)etc. is generally as follows :

Some studies conducted on Rasayana drugs

(A) Immunostimulent action and maintenance of physical health. After research by prof. Dr.SharadiniDahanukar, department of pharmacology, G.S. Medical College,Bombay,it has been proved that these Rasayana herbal drugs act as Immunostimulent and increase the immunity of our body.They bring about the abnormal body tissues in the normal state. The increased immunity results in compactness and normal structure of the body tissues and increased muscular strength due to normal protein synthesis resulting in physical fitness. Hence physical Health is maintained and various physical disorders are averted.

(B) Maintenance of mental health. Rasayana therapy helps to normalise and increase the mental activities such as memory, intellect, concentration, thinking, interpretation etc. and prevents various mental and psycho-somatic disorders.

(C) Prevention of aging. Able to engage in self-care and other activities of daily living. The Ayurveda includes Rasayana, a focused branch of medicine which helps to slow down the ageing process in the human being during the degenerative phase of one‘s life.Drugs like ashwagandha, bala etc[16].

Discussion

Rasayana is one among the eight branches of Ayurveda.Scop of Rasayana is vast and relevant even in this modern era.As a whole Rasayana covers immunology, metabolism and endocrinology. A particular Rasayanadravya can act as Naimittika, Medhya, Pranakamiya also. If given along with treatment, it may provide better and faster relief.Rasayana therapy helps in maintaining swasthya *and* Dirghayu (long life).Rasayana therapy is a unique approach of Ayurveda for the maintenance of healthand cure of diseases. The effect of Rasayna can be achieved by code of conduct known as AcharRasayna.

Conclusion

The Rasayana principleis re-generative which includes rejuvenation therapy. It is useful for protecting life, strengthening the body, to delay aging, and in curing diseases. Classics say that Rasayana is intended to preserve life, improve health, and strengthen the body and to cure diseases. Rasayana is a gradual process of complete development of an individual, both physical and mental faculties.

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CADAVERIC DISSECTION: AN EFFECTIVE LEARNING TOOL IN ANATOMY

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Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Pramod Anand Tiwari and Sakshi* the authors of the research paper entitled CADAVERIC DISSECTION: AN EFFECTIVE LEARNING TOOL IN ANATOMY declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else.We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

The dissection of human cadavers training has remained an important part of the curriculum for decades uniformly in all medical schools all over the world. As in growing number of private medical colleges, supporting varied degree of medical facilities, debate regarding significance of cadavers in teaching of gross anatomy has been the topic for discussions. In spite of availability of cadavers medical colleges lack in putting an effort towards the dissection. Medical students are depriving themselves of this effective learning tool-"Dissection" due to many factors.

In the classical literature and modern sciences, there has been a lot of emphasis on the importance of studying anatomy. Anatomy faces new challenges in 21st century. Anatomy in itself is an interdisciplinary teaching along with clinical, surgical aspects, and to give a direct link to application of anatomical knowledge.

Keywords: dissection, cadavers, clinical anatomy, sushruta samhita, charak samhita.

Introduction

The word anatomy is derived from the Greek term "*anatome"*, that means cutting up. Dissection is globally considered as essential part of medical training[1-2]. Anatomy is one of the oldest subjects in medical sciences. The role of dissection and teaching of anatomy evolved during last half of 20th century, which resulted in new preservation techniques, tools and technology for better understanding. Interestingly, increased availability of innovations used in teaching anatomy, such as interactive

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multimedia resources, models and specimens have not diminished the importance of dissection in the eyes of the medical students.

Dissection persists as a primary teaching tool. The benefits include gaining of practical skills such as appreciation of human body, understanding to anatomical variations, learning team- work as well as ultimately gaining a first hand appreciation of human life through a understanding of death[3]. Anatomy is widely appreciated as being one of the cornerstones of medical education. The famous Sir Astley Cooper(Royal College of Surgeons)said, "without dissection there can be no anatomy, anatomy is our polar star, for without anatomy, a surgeon can do nothing well"[4]. Learning anatomy through dissected cadaver is viewed as uniquely defining feature of medical courses.

Anatomy In Ancient Period

Healing techniques and medical practices are being known to human since a long period. Many civilizations have dealt with healing traditions associated with them and added to the current knowledge pool of medical sciences, particularly in anatomy.

As mentioned in Greece, Mesopotamia, Egypt etc, have added more to the knowledge. Indian civilization being one of the oldest known civilization, is rich in history, tradition and finally which contributed to understand the human morphology[5].

The ancient Indian name of "science" of medicine is 'ayurveda' the veda for (lengthening of) span of life[6].

The two main sets of texts from the foundation of ayurvedic medicine, the sushruta samhita and charak samhita. The sushruta samhita was written by famous physician and surgeon sushruta. In sushruta's work, it is evident that considerable thought was given to anatomical structure, function and he was a proponent of human dissection[7].

Similarly, charak samhita is basically philosophical and ethical in its considerations. Even then charak has considered importance to some of anatomical facts in sharir sthana and else.

Contribution of acharya sushruta to anatomy

The knowledge of anatomy (rachna sharir) can be dealt within sharir sthana of sushruta samhita.

Sushruta was the first to study dissection over the human cadaver. He was the first person who had established the preservation of deceased and cadaveric dissection in scientific manner[8]. The evidence of cadaveric dissection in text is mentioned quoting appropriate translation.

"Anyone who wishes to acquire a through knowledge of anatomy must prepare a dead body and carefully observe and examine all its parts." The method of study was to submerge the body in water for decomposition and then studying its structure, layer by layer after decomposition[9]. Under the quote in (Su.Sh.5/61) has mentioned complete description of dissection[10].

As per teaching aspect, sushruta ordains that anyone who wants to attain surgical skill should study anatomy by practical observation and by dissecting dead body[11]. Interestingly, he mentions role of a student in dissection, a pupil, otherwise well read, but uninitiated in practice is not competent to take hand in medical, surgical treatment of diseases[5].

In embryology, he first dealt with embryology, then anatomy of human body. He dealt with rudiments of embryology and anatomy of human body together with obestricts to interpret their clinical relevance[11]. Developmental hereditary concepts were known to him. He possessed knowledge of arteries, which are described as 'channels'[12].

Skeletal anatomy, has been defined in respect to anatomical variations, prognostic values, management before X-rays were discovered. The marma sharir [13](vital parts) as described by him(Su.Sh.6) has opened many doors to clinical and surgical anatomy,,and various research work has been done in this regard[8].

Discussion

In ancient period , the acharyas have done extremely wonderful work in respect to cadaveric dissection, even with lack of materials. Even then they discovered a lot of clinical and surgical aspect with the structures studied. Dissection is the best way to teach anatomy. Review of previous literature reveals that there are varying responses with regards to the attitudes, emotions and views of medical students towards cadaver dissections. Some of the factors hindering students from the cadaveric dissections are mentioned in the table.1.

T A B L E 1 *Reasons hindering students for cadaveric dissection.*

fear	EmotionalReaction	Toxic Chemical
Religious beliefs	Respect For Body	Low Motivation
Moral beliefs	Anxiety/ TremorsOf Hands	Night Mares
Health reasons	Smell Of Formaldehyde	

To overcome the problems faced in field could be resolved by increased number of cadavers, well qualified demonstrators ,by which interest among students can be created. Even the factor of participation of students in dissection period creates lack of interest and pass out without a complete knowledge of anatomy.

There is a need of increased number of cadavers, demonstrators and students participation.

The different branches of anatomy are based on the basic anatomy with cadaveric dissection going hand in hand. Clinical anatomy reveals all aspects of a structure whether gross, histological, developmental, neurological as applied to clinical practice[14].

An understanding of relevance of anatomy to clinical practice is fundamental for medical students and young doctors. This will confirm the importance of basic anatomy to clinical situation in line with teaching practice which encourage problem solving and will facilitate effective learning.

Conclusion

The clinical anatomy study becomes important as in day to day practice, whether medicinal/ surgical different types of cases are dealt with doctors. For example, anatomical variations which can influence symptomatology, clinical examination, surgeries etc[15]. Accordingly, accurate knowledge of variability in human morphology is important to improve diagnostic and interventional performance especially with respect to different tecnniques[16].

For the advancement in this regard, the cadaveric dissection has to be considered as tool of teaching anatomy. As dissection has survived many historical periods, cultural changes, teaching trends and will continue to evolve, as new teaching technologies are added to the curriculum[17]. Understanding the history of dissection allows to understand its present role and predict future course.

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AYURVEDA AND MODERN PERSPECTIVE OF BREAST-FEEDING IN NEWBORN: A REVIEW

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Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Ashutosh Kumar Pathak and H. H. Awasthi* the authors of the research paper entitled AYURVEDA AND MODERN PERSPECTIVE OF BREAST-FEEDING IN NEWBORN: A REVIEW declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else.We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Introduction

Breast milk has the perfect combination of proteins, fats, vitamins, and carbohydrates. There is nothing better for the health of baby then mother milk, it is widely recognized that breastfeeding is the best nutrition for infants. Breast milk is the optimal food for almost all infants in the first year of life. It provides numerous health benefits to both mother and baby. Breastfeeding should begin soon after birth and is the best way to care for new child. Besides the overwhelming bonding it creates, breast milk is also the perfect food for them. Likewise in Ayurvedic texts, formation of breast milk, causes of milk ejection, breast feeding, are discussed in detail. The description in the ancient classics of *Ayurveda* are still in coherence with modern knowledge and are equally scientific and practical.

Ayurveda perspective

Breast milk formation; ….स्त्रिया ह्यापन्नगर्भायास्त्रिधा रसः प्रतिपद्यतेस्वशरीरपुष्टये, स्तन्याय, गर्भवृद्दये। C.su. 6/23; यदन्नपाने प्रायेण……नार्या गर्भस्तु पुष्यति। Ka.su.leh.2

Breast milk is formed from *rasa* (*rasa*-prashad bhag or bodily fluids) as stated by *Acharya*s. *Acharya Kashyapa*[29] also mentions formation of *stanya* from *rakta* (means blood/ red blood cells and also involves blood vessels, liver and spleen) during pregnancy period and lactation.

धमनीनां हृदिस्थानां विवृतत्वादनन्तरम्। चतुरात्रात्त्रिद्वा स्त्रीणां स्तन्यं प्रवर्तते ।। Su.sa.1/14

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Acharya Sushruta [27]clearly enumerated factors, which results for milk ejection as thought, sight or touch as well as physical contact of the child, but affection for 'the child is mainly responsible . The more the baby sucks at the breast, the greater is the stimulus for milk production. On third or fourth day after delivery, milk ejection starts .

Feeding of neonates; तद्यथा- मधुसर्पिषी मन्त्रोपमन्त्रिते यथाम्नायं प्रथमं प्राशितुं दद्यात्। स्तनमत ऊर्ध्वमेतेनैव विधिना दक्षिणं पातु पुरस्तात् प्रयच्छेत्।।

Acharya Charaka[26] has emphasised that on first day of birth, infant must be fed with honey and ghrita consecrated with mantras, thereafter with similar procedure i.e. consecrated with mantras right breast should be offered for suckling first on the same day of postpartum.

Recent researches had shown that there are differences in the milk output from the right, left breasts are common and that milk output is often greater from the right breast. The differences appear early in lactation, are not related to total milk output and are relatively consistent throughout the day and over the first weeks of lactation.

(Engstrom JL, Meier PP, *etal.,* breast feed Med.2007, Jun2(2):83-91)

तृतीयेऽह्नि चतुर्थे वा स्त्रीणां स्तन्यं प्रवर्तते। प्रथमे दिवसे तस्मात् त्रिकालं मधुसर्पिषी।। अनन्ततमिश्रिते मन्त्रपाविते प्राशयेच्छिशुम्। द्वितीये लक्ष्मणासिद्धं तृतीये च घृतं, ततः।। प्राङ्निषिद्धस्तनस्यास्य तत्पाणितलसम्मितम्। स्तन्यानुपानं द्वौ कालौ नवनीतं प्रयोजयेत्।।A.H.Ut-1/12-14

Sushruta[27] and both *Vagbhata*[28] are of opinion that on first day honey and ghrita mixed with ananta and consecrated with mantras should be given thrice. On second and third day ghrita medicated with lakshamana and on fourth day honey and ghrita in the amount which fills the palm of neonate twice should be given, thereafter from evening free breast feeding as desired by child should be started.

Modern perspective

Breast milk formation; The mature breast resembles a flowering tree in springtime with lobular alveolar complexes, called terminal duct lobular units (TDLU) by pathologists, sprouting regularly from the major ducts. The breast reaches a stage of quiescence marked by some waxing and waning of the TDLU driven by the hormonal changes of the menstrual cycle [(1–4)]. The next stage of development begins in pregnancy. As the levels of progesterone, prolactin and placental lactogen rise, the TDLU undergo a remarkable expansion so that each lobule comes to resemble a large bunch of grapes. During mid-pregnancy, secretory differentiation begins with a rise in mRNA for many milk proteins and enzymes important to milk formation. Fat droplets begin to increase in size in the mammary cells, becoming a major cell component at the end of pregnancy. This switch to secretory differentiation is called stage I lactogenesis [(5,6)].

Milk is produced as a result of interaction of hormones and reflexes (prolactin, oxytocin, rooting and sucking reflexes). During pregnancy and lactation the glandular tissue is stimulated to produce milk due to various hormonal influences [7]. The suckling stimulus on the nipple of the breast causes signals to be transmitted through sensory nerves to the hypothalamus, which causes release of prolactin and oxytocin from the pituitary gland. These hormones are then carried by the blood to the breasts, where it promotes secretion of milk and contraction of myoepithelial cells of the mammary glands leading to ejection of the milk from the glands. In less than a minute after the beginning of suckling, milk begins to flow [8].

The gland remains quiescent but poised to initiate copious milk secretion around parturition. This period of quiescence depends on the presence of high levels of circulating progesterone; when this

hormone falls around the time of birth, stage II lactogenesis or the onset of copious milk secretion ensues. As long as prolactin secretion is maintained and milk is removed from the gland, the mature function of the breast, milk secretion, is maintained. After weaning, the TDLU involutes with the apoptosis of a large proportion of the alveolar cells and a remodeling of the gland so that it returns to the mature quiescent state [9].

It is especially interesting that fondling of the baby by the mother or hearing the baby crying often gives enough of an emotional signal to the hypothalamus to cause milk ejection. Many psychogenic factors can inhibit oxytocin secretion and consequently depress milk ejection [7]. Prolactin "Milk secretion" reflex enhancing factors are sucking, expression of milk, emptying of breast, night feeds and hindering factors: incorrect position, painful breast, prelacteal feeds, top feeding. Oxytocin "Milk ejection" reflex enhancing factors are thinking lovingly of baby, sound of baby, sight of baby, mother is relaxed /comfortable/ confident and hindering factors are worry, stress, pain, doubt [10].

Feeding of neonates; The feeding of newborn infants has important implications for immediate and future health, especially in developing countries that have high rates of malnutrition, infectious diseases and mortality for children under the age of 5 years [11,12]. Exclusive breast-feeding from birth through 6 months of age has long-term health and emotional benefits for both mother and child and is associated with lower infant morbidity and mortality and better growth[13]. Given the health risks associated with artificial (formula) feeding and ineffective breast-feeding, WHO and UNICEF developed a strategy to underscore the importance of exclusive and maximal breast-feeding, summarized in their guide for practitioners entitled ten steps to successful breastfeeding[14,15]. These steps include educating mothers about breast-feeding management; helping mothers and babies initiate breast-feeding within 30 min of giving birth; and prohibiting prelacteal feeding (feeding any other substance before first breast-feeding) or complementary feeding any substance other than breast milk before the age of 6 months.

Colostrum is a thick yellow/orange breast milk that is the earliest and most immunologically protective secretion of the mammary gland during lactogenesis I [15,16]. It is highly nutritious, easily digested and contains maternal cells and substances that act as a natural vaccine for the infant against a host of immunological threats including bacterial diarrhoea [16,17]. Delivery of the placenta reduces physiological levels of oestrogen and progesterone, signalling the start of lactogenesis II and secretion of a more carbohydrate-rich and more fluid breast milk[15] usually within 30–40 h postpartum. This increased fluid secretion dilutes the coloured immunological layer and makes it invisible to the naked eye.

Milk transfer to the suckling infants starts at a volume of 100 mL/d on d 1 postpartum, begins to increase 36 h after birth and levels off at an average of 500 mL at 4d. Milk composition also changes dramatically during this period, with a fall in the sodium and chloride concentrations and an increase in the lactose concentration that starts immediately after birth and are largely complete by 72 h postpartum [18]. These changes precede the onset of the large increase in milk volume by at least 24 h and are explained by closure of the tight junctions that block the paracellular pathway. Next, the concentrations of secretory immunoglobulin A and lactoferrin increase dramatically and remain high to 48 h after birth [19,20]. Their concentrations fall rapidly after d 2, in part because of dilution as milk volume secretion increases, but their secretion rate is still substantial (2–3 g/d for each protein throughout lactation). Oligosaccharide concentrations are also high in early lactation, comprising as much as 20 g/kg of milk on d 4[21,22], falling significantly to a level of 14 g/L on d 30. These complex sugars are also considered to have substantial protective effect against a variety of infections [23]. Thus, during the first 2 d postpartum, large molecules with significant protective power dominate in

the mammary secretion; the total nutrient value is low, simply because the amount of milk transferred to the infant is small. The substantial volume increase occurring between 36 and 96 h postpartum is perceived as the coming in of the milk and reflects a massive increase in the rates of synthesis and/ or secretion of almost all the components of mature milk [19], including but not limited to lactose, protein (primarily casein) [24,25], lipid, calcium, sodium, magnesium and potassium . Considering the secretion patterns for each of the milk components shown in Figure 1 below, the coordination achieved by the mammary epithelial cell among the activity of the various pathways that contribute all these different milk components is a marvel.

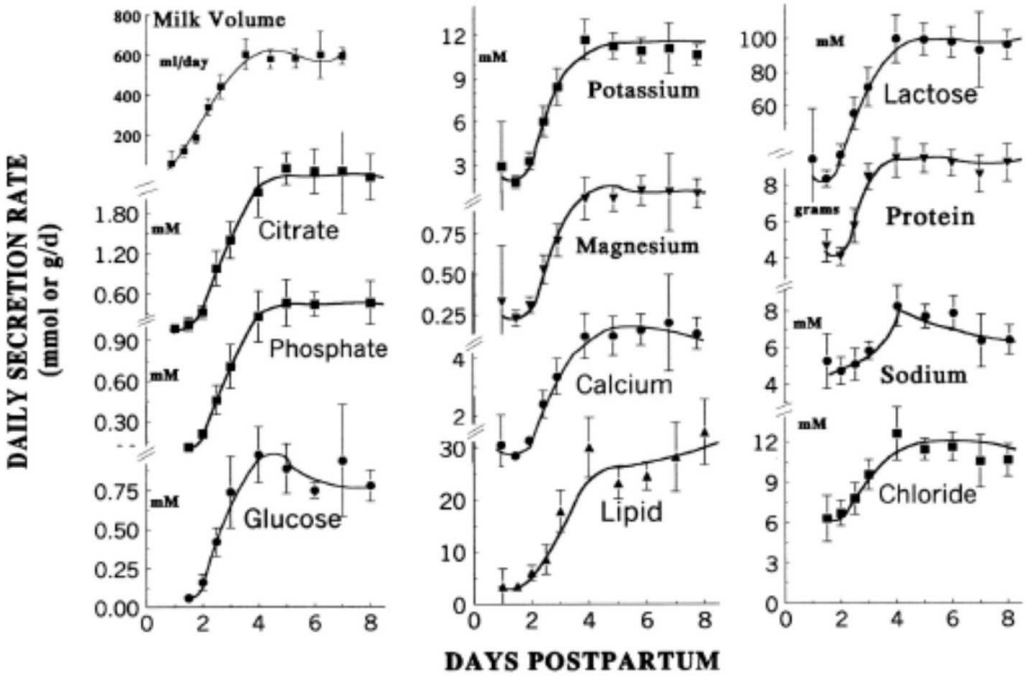

Figure 1 The rate of secretion of milk volume and macronutrients in milk during the first 8 d postpartum. (Adapted from Physiology and Endocrine Changes Underlying Human Lactogenesis II1,2 Margaret C. Neville*3 and Jane Morton†
*Department of Physiology, University of Colorado Health Sciences Center, Denver CO 80262
and †Stanford University School of Medicine, Palo Alto Medical Foundation, Palo Alto, CA 94028)

Discussion

Breast milk formation; The breast milk formation and manifestation seems similar in *Ayurveda* and in modern era as both considers the infant cry, touch, etc and emotional, psychological aspect of mother as the triggering factor for lactation. The modern sciences considers hormonal coordination as factor for lactogenesis similarly ancient *Acharya* holds *rasa* circulating in whole body responsible for the same.

Feeding schedule; The description of *Acharya Charaka* seems more acceptable in present era .i.e. breast feeding from first day as breast feeding at earliest possible time after delivery to a healthy neonates by healthy mother is said to be beneficial for both, also , the baby can get advantage of colostrum.

Feeding schedule for first three days advised by *Sushruta* and both *Vagbhata*s does not seem to be proper at first sight, because respective feeds are advised thrice or during three periods .i.e morning,

noon and evening. If it is inferred that any number of feeds can be given during these periods then amount of honey and ghrita ingested by the neonate would be much beyond digestive capacity, however, if feeding is given only thrice, then it will not be sufficient for nourishment specially for requirement of water. The other dimension may be that the *Acharya*s has never restricted the breast feeding of infants and these are complementary feeding that may fullfill the nutritional need of infant for initial 4 days. It is quite evident from the review and fig.1 that the breast milk is lesser in nutrients and volume in initial four days of lactogenesis II, that's why *Acharya*s may had emphasised the complementary feeds for initial four days.

The logic of initiation of breast feeding with right breast may be explained on the basis of the fact that the differences in the milk output from the right and left breasts are common and that milk output is often greater from the right breast.

It seems that *Acharya* are of view of exclusive breast feeding, that's why, they had not advised any complementary feed after 4th day, with a scientific reason that infant should be fed exclusively on breast milk as the lactogenesis starts i.e. on 3-4th day of postpartum till that external supplement as mentioned above can help in nutrition alongwith breast milk. Exclusive breast feeding must be followed for proper devlopment of new born.

Conclusion

Combining all schools of thought in light of modern knowledge it can stated that the concepts of lactation and breast-feeding in *Ayurveda* were scientific and practical can be summarized as follows :

- Breast feeding must be started on the day of postpartum.
- Feeding must be started from right breast.
- Infant must be fed exclusively on breast mik as the lactogenesis starts, Till that external supplement as mentioned by *Acharya*s can help in nutrition alongwith breast milk.

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USE OF HERBAL DRUGS IN THE MANAGEMENT OF UTERINE FIBROIDS- A CLINICAL STUDY

Dr Amit Kumar Singh*

Declaration

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Abstract

It has been estimated that about 20 percent of women have been diagnosed to be having fibroid in the womb by the age of thirty years . The reason for the increasing incidence of occurrence of this condition can be attributed to chage in the lifestyle , stress , tension etc . clinical management of eight patient having benign fibroid with ayurvedic medicines based on ayurvedic principles is the highlight of the paper .

Introduction

Fibroid is the commonest benign solid tumour of the uterus . But most women are asymptomatic . Though the occurrence of Fibroid is very high , the etiology still remains unclear. Fibroid has been understood to be a estrogen dependent tumor . Estrogen unopposed by progesterone is indicated as the cause of fibroid . Artava being the upadhatu of rasa dhatu , any pathology in the formation of rasa dhatu at the level of jataragni or dhatvagni has a direct bearing on the menstrual cycle , ovulation or conception.

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Material and Methods

Sonologically confirmed cases of fibroid in the uterus were selected for this study , patient with the history of menorrhagia , dysmenorrhoea and along with asymptomatic cases were part of the study . patients with severe bleeding were excluded from the study . patient profile is as follows .

Case	Age	No of children	Occupation	Size of fibroid	Signs & symptoms no
1.	28	-	working	8.2×4cm AF 6.2×2.3 PFW	hydrnephrosis asymptomatic
2.	40	3	housewife	2.2×1.6cm AW 1.4×1.2cm LW	dysmenorrhoea
3.	37	2	housewife	2.4×2.6cm CF	fre micturition
4.	40	3	housewife	3.2×1.8cm PFW	asymptomatic
5.	41	1	working	2.8×3cmAW Of uterus	menorrhagia, anemia
6.	39	1	housewife	multiple fibroid	metrorrhagia
7.	44	2	working	4.2×1.9cm PW	metrorrhagia
8.	41	1	housewife	multiple fibroid	asymptomatic

AF- Anterior fundal wall , PW-Posterior fundal wall CF-Cervical fibroid, AW-Anterior wall , LW-Lateral wall

Treatment protocol

Main drugs; Patients were administered

1.) Kankayana vati(gulma) 2 tab t.i.d
2.) Exher tab / M2tone 2 tabs t.i.d depending upon the symptoms.
3.) Chandraprabha vati 2 tabs o.d
4.) Lashunadi vati 1 to 2 tabs a day .

Associated treatment : In associated stress brahmi ghrita / phala ghrita 2 tsf on empty stomach early in the morning.

Kanchanara guggulu 2 b.i.d

Ashol M/M2tone depending on severity of bleeding 2 t.i.d

Hemostal / raktabandha/ bolabaddha rasa depending on the severity of the bleeding 2 t.i.d

Diet : Patient were asked to incorporate dates , dry grapes , lashuna , shatapushpa , methi powder , jeera powder in their diet. Patient were asked to practice some asanas , including shavasana and breathing exercise to maintain physical as well as mental health.

Result

Case no	Duration of the treatment	Size of fibroid	Remark
1	8 month	2.3×0.5cm 0.2×0.5cm	she conceived
2	6 month	no fibroid Nabothian cyst	advise chand raprabha vati
3	5 month	0.5×.2mm	on treatment
4.	4 month	no fibroid	discontinue tt
5.	6 month	no fibroid	discontinue tt

6.	6 month	no fibroid	discontinue tt
7.	9 month	no fibroid	discontinue tt
8.	6 month	no fibroid	discontinue tt

Discussion & conclusion

References available in the classical texts of vagbhata , kashyapa and dalhana accept the presence of shonita or raja from the very childhood just like shukra which is not visible due to minute quantity according to chakrapani , artava which is explicit at 12 years is formed in the embryonic life itself. The references in books of sushruta , bhavamishra , vagabhata , chakrapani regarding the development of the different epochs of women and physiology directly or indirectly refers to artava here artava referes to hormones specially estrogen . Artava is the upadhatu of rasa dhatu . Formulation aimed at correction of rasa dhatu with special reference to the particular upadhatu has been chosen as the line of treatment . Due importance has also been given to see that the symptomatic relief is also taken care as the treatment schedule called for administration of medicine for minimum period of 3 months. With the adverse in technology to reconfirm the results diagnostic method as per the modern diagnostic has also been used to boost the morale of the patient and for the documentation purpose this needs to be studied and documented further in large number of patient .

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THE SPECTRAL STUDIES OF NICKEL(II) COMPLEXES MULTIDENTATE LIGAND

DARPAN SINGH* AND VISHRUT CHAUDHARY**

Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Darpan Singh and Vishrut Chaudhary* the authors of the research paper entitled THE SPECTRAL STUDIES OF NICKEL(II) COMPLEXES MULTIDENTATE LIGAND declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else.We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

The Nickel (II) complexes with formula $[Ni(C_{20}H_{22}N_4S)X_2]$ *as* $X = NO_3^- > CH_3COO^- > HCOO^- > SCN^- > Cl^- > NCS^-$ *have been synthesized and characterized utilizing a multidented ligand. The NMR data lies in the range of +70 – 185 ppm* ^{1}*HNMR typical of high spin Ni (II) Complexes and No doubling of peaks observed in NMR spectra. The U.V so the* $\pi \rightarrow \pi^*$ *transactions with in a benzimidazolyl group.*

Introduction

Nickel shows a wide range of oxidation states varying from (-1) to (+IV) but its chemistry is predominantly that of the (+II) state. Nickel (II) forms a large number of complexes with coordination numbers four to six. Octahedral complexes are characteristically blue or purple. Three spin allowed transitions $^3A_{2g} \rightarrow {}^3T_{2g}$; $^3A_{2g} \rightarrow {}^3T_{1g}$(F), $^3A_{2g} \rightarrow {}^3T_{1g}$ (P) are expected from the energy level diagram of a d^8 ion. Octahedral nickel (II) complexes having two unpaired electrons have magnetic moments ranging from 2.83 to 3.4 BM depending on the magnitude of orbital contribution.

A considerable number of trigonal bipyramidal (D_{3h}) and square pyramidal (C_{4v}) complexes are known[2] and both high and low spin examples of each geometry occur.[3] If coordination number is known to be four, diamagnetism is indicative of planar (generally red or yellow complexes) as opposed

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to tetrahedral coordination. While in tetrahedral symmetry the d^8 configuration gives rise to a $^3T_1(F)$ ground state and transition to $^3T_1(P)$ state occurs in visible region. Therefore tetrahedral complexes are generally strongly coloured blue or green with magnetic moments[4] of 3.5 to 4.0 BM.

Urease is a nickel-dependent metalloenzyme that catalyzes the hydrolysis of urea to ammonia and carbon dioxide (Hausinger,R.P.,1993) in conjunction with biological functions using urea as a nitrogen source. It was first isolated from jack beans in 1926 and later from various origins such as bacteria, fungi and plants. A recent X-ray crystallographic study on microbial urease from Klebsiella aerogenes has identified a dinickel active site (Jabri, E.,1995).

Experimental; Nickel salts (AR) grade were used as supplied. Other chemicals used were of reagent grade.

Prepration of Ligand; The multidentate ligand 1,5-bis(4-methyl,benzimidazol-2-yl)-3-thiapentane was synthesized by 3,3'-thiodipropionic acid and 3,4-diamino toluene was added to 4 M aqueous HCl. The solution was refluxed for 30-36 hours and was filtered while hot. On cooling, the filtrate blue crystals were formed which were formed were washed with methanol and dried under vacuum over anhydrous calcium chloride.

Synthesis of Complexes; $[Ni(C_{20}H_{22}N_4S)(NO_3)_2]$: To a stirred solution of 2 mmol of ligand BMBES in 30 ml of MeOH, green solution of $Ni(NO_3)_2$ in 10 ml MeOH was added. Stirring was continued for 7-8 hours. Resulting blue solution was refluxed and concentrated to approximately 5 ml on a rotatory evaporator. On cooling it produces blue coloured crystalline mass.

$[Ni(C_{20}H_{22}N_4S)X_2]$; ($X=CH_3COO^-$, $HCOO^-$) : To an aqueous solution of $NiCl_2$, an aqueous solution of NaOH was added and precipitated nickel hydroxide was washed and suspended in methanol. A dilute solution of acetic acid or formic acid in methanol (1 : 1) was added dropwise till the precipitate dissolved to give a clear solution. This was then added to a solution of ligand. The resulting green solution was stirred for 5-6 hours. Dry diethyl ether was layered above the solution and the mixture on cooling bluish green coloured mass.

$[Ni(C_{20}H_{22}N_4S)Cl_2]$: To a solution of ligand 1,5-bis(4-methyl, benzimidazol- 2-yl)-3-thiapentane in 30 ml MeOH was added. The resulting bluish green solution was stirred for 8 hours. Addition of ether to this solution was continued till a turbidity was obtained on subsequent cooling overnight in refrigerator produced a light green microcrystalline product. $[Ni(C_{20}H_{22}N_4S)(NCS)_2]$: To a solution of $NiCl_2.6H_2O$ slight excess of a methanolic solution of KSCN was added. Precipitated potassium chloride was filtered off to give a clear green solution containing $Ni(CNS)_2$. This was then added to a solution of ligand. The resulting clear bluish green solution was stirred for 4-5 hours. Light bluish green microcrystalline product separated out.

The electronic and magnetic moment of the complexes are given in Table 1.

T A B L E 1 *Magnetic and electronic spectral data of the complexes.*

Compound	λ_{max} (nm)	Log∈
$[Ni(C_{20}H_{22}N_4S)NO_3)_2]$	240	4.14
	269	4.10
	276	4.15
	378	1.60
	608	1.24
	802	-
	1020	-
$[Ni(C_{20}H_{22}N_4S)(CH_3COO)_2]$	240	4.18
	270	4.28

	276	4.18
	380	1.40
	620	1.14
	800	-
	954	-
	1046	-
$[Ni(C_{20}H_{22}N_4S)Cl_2]$	240	4.18
	270	4.25
	277	4.23
	390	1.26
	653	0.97
	778	-
	1088	-
$[Ni(C_{20}H_{22}N_4S)(HCOO_2]$	240	4.18
	270	4.23
	278	4.22
	382	1.54
	626	1.14
	800	-
	1068	-
$[Ni(C_{20}H_{22}N_4S)(NCS)_2]$	240	4.24
	270	4.28
	278	4.26
	388	1.44
	638	1.08
	778	-
	993	-
	1068	-

Result and Discussion

U.V. Spectroscopy; The UV spectra of nickel (II) complexes show characteristic absorption bands in the region of 270-280 nm and are assigned to the $\pi \rightarrow \pi*$ transitions within the benzimidazolyl group (Barandika,M.G.2000). Their absorption maxima and respective extinction coefficients are reported in Table 1. The UV bands are slightly blue shifted and enhance in intensity (Rubak-Akim ova,E.V.,1998) in their respective complexes showing evidence of imine nitrogen coordination to the nickel (II) center.

The crystal field spectra of six coordinated octahedral nickel(II) complexes are known to exhibit a simple spectrum involving three spin allowed transitions from $^3A_{2g}$ to $^3T_{2g}(F)$, $^3T_{1g}(F)$and $^3T_{lg}$ (P) levels. These occur in the range of 7000-13000 cm^{-1}, 11000-20,000 cm^{-1} and 19,000-29,000 cm^{-1} regions respectively. with molar intensities less than 30 $M^{-1}cm^{-1}$, in regular octahedral systems.

It is well known that five coordinate complexes of nickel(II) can be high- or low-spin in both trigonal bipyramidal and square pyramidal geometries. The energy of the ground term is raised and the energy of the excited term lowered to a significant extent on the introduction of square pyramidal or trigonal bipyramidal ligand field around nickel(II) even with small amount of covalent character in the nickel(II) ligand bond. This places the highest energy band in such complexes to a maximum of 25,000 cm^{-1} (400 nm).

A study of absorption spectra could be used to distinguish between the octahedral complexes that often have two bands at 10,000 cm^{-1} and 16000-16800 cm^{-1} and the five coordinate species which shows

a greater multiplicity of bands in the visible spectrum with molar intensity of 30-50 $M^{-1}cm^{-1}$. The orbital energy diagram arising for the triplet states of d^8 configuration with a axial ligand distortion is shown in Fig. 4.1 and the origin of multiplicity of bands in such tetragonal complexes is interpreted to be due to the lifting of the degeneracy of orbital triplet arising from the ^3F and ^3P free ion terms.

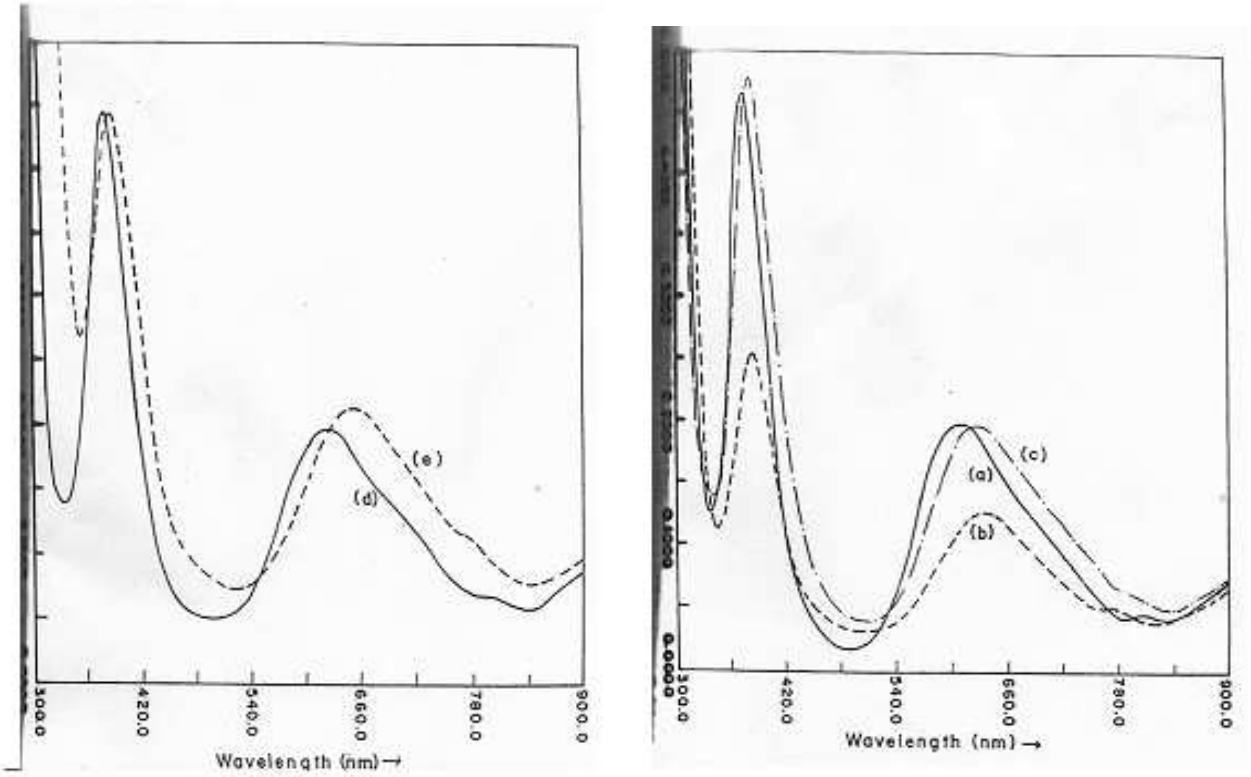

Fig 4.1 Spectra of U.V.

The visible spectrum of all the Ni(II) complexes taken in MeOH. The λ_{max} of these bands along with their extinction coefficients. The stoichiometry of our complexes is suggestive of five coordinate geometry in the solid state. However since the solution spectra indicate a high energy band in the region ≥ 25000 cm^{-1}. We suggest that in solution the five coordinate Ni^{II} complexes acquire a sixth weakly bound solvent molecule. Also the spectra show a large number of bands with extinction coefficients higher than 30 $M^{-1}cm^{-1}$ indicative of lowering of symmetry of a regular octahedral to tetragonal. Thus the solution spectra of the Ni^{II} complexes are interpreted in terms of six coordinated tetragonal complex, rather than a distorted trigonal bipyramidal or square pyramidal complex.

N.M.R. Spectroscopy; ^{1}HNMR signals of the paramagnetic Ni (II) complexes with ^{1}HNMR of the ligand ($C_{20}H_{22}N_4S$), it has been found that due to the paramagnetic effect, the resonance lines become extremely broad and actual integrated intensities are difficult to measure.

Moreover, some resonances with long nuclear τ_1 will saturate and will appear with diminished intensities at R_f power needed to detect resonances with short τ (broad peaks). Hence integrated peak intensities have not been considered in the present assignments (Comba,P.,2000). The ^{1}HNMR spectra of the above complexes lie in the range of -19.0 to +55.0 ppm with respect to the reference tetramethylsilane (TMS). The signal arising between +50 to +55 ppm (downfield with respect to TMS) is absent when the ^{1}HNMR is run in the presence of D_2O. This is expected if there is a rapid exchange between the N-H proton in the benzimidazole nucleus and the D_2O present in the solvent. This thus ensures the assignment of N-H proton (Boeyens,J.C.A.,2009) in the present series of Ni(II) complexes.

IR Spectroscopy; On the basis of analytical and spectroscopic studies, the proposed structure for the Ni (II) complexes is as follows :

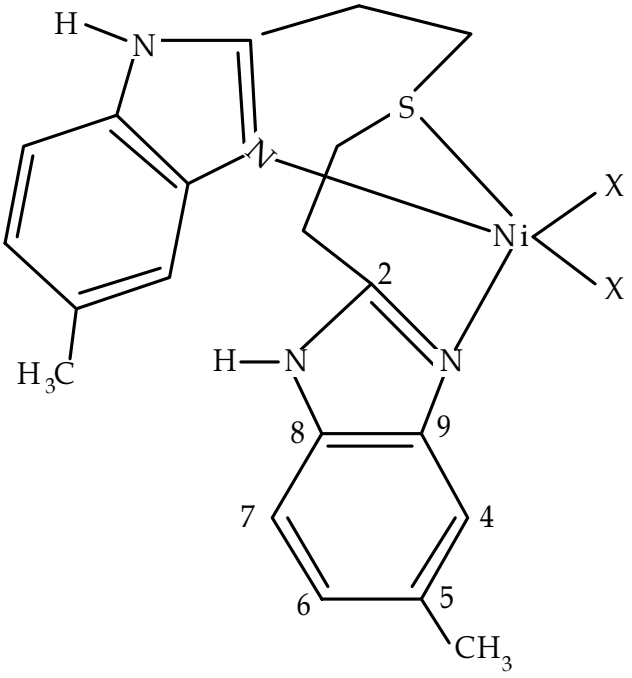

Figure 2. Proposed structure of nickel (II) complexes

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