

ORIGINAL RESEARCH ARTICLE

Management of Bhagandara (Fistula In Ano) Under the Influence of “Karanjadi Ghrita”**Dr. Hemant Kumar Seetha*¹, Dr. Madhavi Seetha²**¹M.D.(Ayurveda) Ksharasutra Speciality, Medical officer, Govt. of Rajasthan, India²Assistant Professor, Department of Pancchakarma, MSM Institute of Ayurveda, BPS Mahila Vishvavidyalaya, Khanpur Kalan, Sonapat (Haryana) Pin 131305

Received 21 Mar 2013; Revised 28 May 2013; Accepted 10 Jun 2013

ABSTRACT

Sushruta, the father of surgery has narrated 8 *Mahagadas* (difficult curable disease). *Bhagandara* (fistula-in-ano) is one among the *Mahagadas*. The word ‘*Bhagandara*’ literary means splitting or *darana* around *guda*, *yonis* & *basti*. Thus it conveys that fistula-in-ano is a very painful, dischargeable and uncomfortable condition which presents a challenging situation from the viewpoint of surgeons and a constant source of anxiety and agitation for the sufferer. In this study 20 patients were treated with *Standard Ksharsutra* along with the local application (*Vrana Basti*) of *Karanjadi Ghrita* for the duration of 6 weeks. Result of the study revealed that *Standard Ksharsutra* and *Karanjadi Ghrita* provide highly significant relief in the signs and symptoms of *Bhagandara*.

Key words: *Bhagandara*, Fistula-in-ano, *Ksharsutra*, *Ghrita*, UCT.**INTRODUCTION**

Fistula-in-ano is a commonest disease of the ano-rectum, which is characterized by single or multiple sinuses with purulent discharge in perianal area. It becomes a very notorious disease because of its anatomical situation, recurrences and difficult to cure. The most common cause of fistula-in-ano is anal gland sepsis.

This fistulous track is nothing but a passage of fibrous tissue, the walls of which are unable to collapse. The fibrous tissue does not permit the fresh and healthy granulation tissue to cover the space.

In *Ayurveda* similar condition, due has been described by various texts and termed ‘*Bhagandara*’. According to “*Charaka*” the extremely painful boil near the anus, when suppurate and bursts results in *Bhagandara*. *Sushruta* similarly mentions *Bhagandara* as the suppurating stage of a boil in the peri-anal region. The word ‘*Bhagandara*’ literary means splitting or *darana* around *guda*, *yonis* & *basti*. Thus it conveys that fistula-in-ano is a very painful, dischargeable and uncomfortable condition which presents a challenging situation from the

viewpoint of surgeons and a constant source of anxiety and agitation for the sufferer.

In this study the selected drugs as “*Karanjadi Ghrita*” is the first choice because its decrease post ligation *Ksharsutra* complication i.e. pain, burning sensation, discharge & itching by uses locally. As well the standard *Ksharsutra* applied which helps to the cutting in the tract of fistula-in-ano.

In modern surgery treatment for anal fistula involves an extensive excision of the fistulous tract. The wide open wound refuses to heal spontaneously and might tack months together to produce described results of healing and painful post operative dressings. In fistulectomy did not prove its significance the standard surgeons because the primary closure of the wound often resulted in collection of the tissue fluid inside giving rise to a secondary abscess formation and recurrence of fistula.

Therefore, in these circumstances, an alternative method was need for study which combination of surgical and para-surgical technique. In such a situation, the ancient technique like *Ksharsutra* came to the free of surgeons, since a chemical

fistulectomy rather than a surgical fistulectomy proved to be free from complications. The foreword of *Ksharsutra* into the fistulous track was capable of dissolving the tough fibrous tissue and ultimately draining it out creating a healthy base for healing. The *Ksharsutra* treatment of fistula-in-ano is now an accepted technique in India.

AIMS AND OBJECTS

1. To enhance the healing process after the cutting of fibrous track and relieve the patients from discomfort i.e. burning sensation, pain, inflammation etc. that remains for 2-3 hour after each thread change.
2. To develop more simplified and ideal therapy with addition to more healing effect and less discomfort to the patient along with K.S. therapy.
3. To study indigenous medicine; which is described by the *Sushruta* in the management of *Paittic Vidhradi* as healing agent.

MATERIALS AND METHODS

Clinical study

A clinical study was trial in the ano-rectal unit of post graduate Dept. of Shalya Tantra, N.I.A., Jaipur (Raj), for the management of fistula-in-ano with standard *Ksharsutra* and *Karanjadi Ghrita* local application (*Vrana Basti*) in the fistulous track.

Selection of patients:

The selected patients were examined thoroughly as per the case sheet especially designed for study. In the middle of them, those who reached with a primary complaint of discharging wound (sinus), discomfort, pain in the perianal region were selected for this study.

Grouping of patients:

For the clinical trial 20 patients were grouped into 2 groups consisting of 10 patient in each group- Group A - in this group of patient's only standard *Ksharsutra* was ligated.

Group B - in this group of patients *Karanjadi Ghrita* was local application (*Vrana Basti*) in the fistulous track and standard *Ksharsutra* was ligated.

Inclusion criteria:

The cases were selected from patients attending to Anorectal Clinic of department of Shalya in N.I.A, Jaipur at random of above age 20 years, sexes, operative recurrences, various duration, signs and symptoms as documented in Ayurvedic classics.

Exclusion criteria:

- (1) High anal fistula.
- (2) Post operative incontinence of stool.
- (3) Secondary fistula due to Ulcerative colitis, Tuberculosis, Crohn's disease, Carcinoma of Rectum.
- (4) External or Internal Haemorrhoids.
- (5) Fissure-in-ano.
- (6) HbS Ag +ve patients
- (7) HIV +ve patients
- (8) Diabetes mellitus
- (9) Children

Assessment criteria:

1. U.C.T. = $\frac{\text{Total No. of days taken for cut through}}{\text{Initial length of track in cms}}$ = days/cm
2. Pain
3. Burning sensation
4. Discharge
5. Itching.

Scoring criteria

Table 1: Grading of Pain/Burning sensation as clinical finding

Grade score	Explanation		
0	Absent	-	00 %
1	Mild	+	25 %
2	Moderate	++	50 %
3	Severe	+++	75 %
4	Unbearable	++++	100 %

Table 2: Grading of Discharge as clinical finding

Grade score	Explanation
0	No discharge
1	If <i>Vrana</i> (wound) wets ½ x ½ cm gauze piece (Mild)
2	If <i>Vrana</i> (wound) wets 1 x 1 cm gauze piece (Moderate)
3	If <i>Vrana</i> (wound) wets more than 1 cm gauze piece (Severe)
4	Continuous and copious discharge

Table 3: Grading of Itching as clinical finding

Grade score	Explanation
0	No itching at any time.
1	Negligible itching, with 10-12 hrs gaps.
2	Occasional sensation of itching with 4-6 hrs gaps.
3	Frequent sensation of itching with 2-3 hrs gaps.
4	Frequent sensation of itching with 15-30 minute gap.

Drug review

In the management of *Bhagandara* different medicines are mentioned in different text books of *Ayurveda* as various types of *taila*, *lepa*, *churna* & *guggulu* etc.

In this present study work "*Karanjadi Ghrita*" was used for the treatment of *Bhagandara* as healing agent which mentioned in *Sushruta samhita Vidradhi Chikitsa Adhaya*. On the other hand the standard *Ksharsutra* was ligated in the fistulous track.

It has been noticed that the post application of *Ksharsutra* in fistula-in-ano the patients are

suffered from some complications like pain, burning sensation, discharge, Inflammation & itching; that situation the selected drugs *Karanjadi Ghrita* (*Su. S. vidh. Chi.*) was the best for the following reasons. The contents are:-

1. *Karanja*
2. *Chameli*
3. *Patola*
4. *Nimba*
5. *Haridra*
6. *Daruharidra*
7. *Madhuyasti*
8. *Kutaki*
9. *Priangu*
10. *Kushamoola*
11. *Manjistha*
12. *Chandana*
13. *Ushira*
14. *Kamala*
15. *Sariva*
16. *Krishnasariva*
17. *Nishoth*
18. *Mome*
19. *Cow's Ghrita*

Preparation of Karanjadi Ghrita:

The drug (*Karanjadi Ghrita*) prepared in the Pharmacy of N.I.A. Under the Department of *Ras Shastra & Bheshjya Kalpana*.

Preparation Of Ksharasutra :

The Standard *Ksharasutra* prepared in the anorectal unit of post graduate Dept. of Shalya Tantra, N.I.A., Jaipur (Raj).

The contents of standard *Ksharasutra* are:-

1. *Snuhi Ksheera* (*Euphorbia nerifolia*)
2. *Apamarga Kshara* (*Achyranthus aspera*)
3. *Haridra Churna* (*Curcuma longa*)

Briefly, preparation of *Ksharasutra* comprises smearing a 50 cm long Barbar's Surgicle thread

No.20 sequentially with fresh latex (*Snuhi Ksheera*) of *Euphorbia nerifolia* Linn. (*Euphorbiaceae*) a specially prepared alkaline powder known as *Apamarga Kshara* from *Achyranthes aspera* Lina. (*Amranthaceae*) and powder of the dried rhizomes of turmeric (*Haridra*) *Curcuma longa* Lina. (*Zingiberaceae*). The thread is coated manually first with the latex eleven times, followed by seven alternate coating of latex and *Apamarga Kshara* and dried at 50°C in specially designed drying cabinet. In the final phase, three alternate coating of latex and turmeric powder are given and the thread is dried. The threads thus prepared are given a single fold and enveloped in a polythene sachet which is sealed and packed in a glass tube along with a silica bag as the desiccant

STATISTICAL ANALYSIS

All information which are based on various parameter was gathered and statistical was carried out in terms of mean (X), standard deviation (S.D.), standard error (S.E.), paired test (t-value) and finally result were incorporated in term of probability (p) as –

p < 0.05 - Insignificant

p < 0.01 - Significant

p < 0.001- Highly Significant

RESULTS

Clinical study has been conducted in well-established cases of *Bhagandara* (Fistula-in-ano). Each and every patient has undergone complete clinical examination and laboratory investigations. The total numbers of 20 cases were divided into 2 groups, 10 patients in each group. Group (A) was treated with only *Standard Ksharasutra* Application (ligation), while group (B) was treated *Karanjadi Ghrita* with *Standard Ksharasutra* ligation.

Table 4: Showing average U.C.T. and their deviation mean of group (A)

Pt. No	Initial length of track (cm)	Total days for cutting	U.C.T.	Deviation from mean	d ²	U.C.T. cm/day
1	5	37	7.4	-0.64	0.41	0.2
2	4	32	8.0	-0.04	0.001	0.25
3	10	81	8.1	-0.06	0.003	0.1
4	7	59	8.43	0.39	0.15	0.14
5	8	68	8.5	0.46	0.21	0.13
6	12	106	8.83	0.79	0.62	0.08
7	4.1	31	7.56	-0.48	0.23	0.24
8	8.5	68	8.00	-0.04	0.001	0.12
9	4.6	36	7.83	-0.21	0.044	0.22
10	9.6	75	7.81	-0.23	0.052	0.10
Average U.C.T.8.04			Σd ² = 1.721			

Above table shows the average unit cutting time (UCT) was 8.04 day/cm. where S.D.= 0.44 and S.E.= 0.14

Table 5: Showing Average U.C.T and their deviation mean of Group (B)

Pt. No	Initial length of track (cm)	Total days for cutting	U.C.T.	Deviation from mean	d ²	U.C.T. cm/day
1	7.4	58	7.84	-0.1	0.01	0.14
2	5.0	39	7.8	-0.14	0.019	0.2
3	4.3	32	7.44	-0.5	0.25	0.23
4	5.8	44	7.59	-0.35	0.123	0.17
5	8.2	66	8.05	0.11	0.012	0.12
6	6.2	49	7.20	-0.74	0.547	0.15

7	5.9	47	7.97	0.03	0.0009	0.17
8	4.8	39	8.13	0.19	0.036	0.20
9	9.2	80	8.69	0.75	0.562	0.11
10	3.0	24	8.0	0.06	0.0036	0.33
Average U.C.T. 7.94			$\Sigma d^2 = 1.563$			

Above table shows the average unit cutting time (UCT) was 7.94 day/cm. where S.D. = 0.41 and S.E.= 0.13. In between two groups average unit cutting time shows very negligible difference

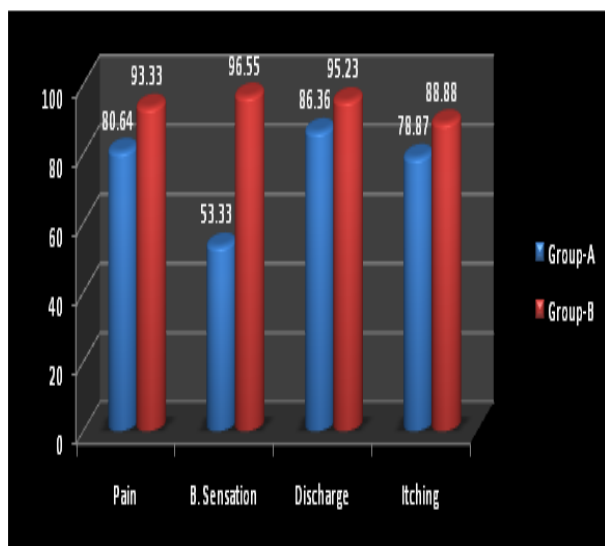
Table 6: Showing: Total average U.C.T. In days/cm. of Group A & B

S. No	Group of Patients	Number of Patients	U.C.T. (days/cm)
1	Group A	10	8.04
2	Group B	10	7.94

Above table shows that the average U.C.T. of group (A) was 8.04 and group (B) was 7.94 days/cm

Table 7: Overall results in both groups

Sign & Symptoms	Group – A					Group – B				
	%	S.D.	S.E.	t	p	%	S.D.	S.E.	t	p
Pain	80.64	0.84	0.26	9.3	<0.001	93.33	0.42	0.13	21	<0.001
Burning sensation	53.33	0.96	0.30	5.2	<0.001	96.55	0.63	0.2	14	<0.001
Discharge	86.36	0.73	0.23	8.1	<0.001	95.23	0.47	0.14	13.4	<0.001
Itching	78.87	0.73	0.2	11	<0.001	88.88	0.69	0.22	10.8	<0.001



Graph 1: Overall results in both groups

The above table and graph shows the two groups of percentage of relief in signs & symptoms and also t, p, values depending on the weekly assessment. The percentage of relief in pain at the end of 6th week in group A was 80.64% with t-value=9.30 where as group B was 93.33% with t-value=21. The percentage of relief in burning sensation in group A was 53.33 with t-value=5.23 where as group B was 96.55% with t-value=14. The percentage of relief in discharge in group A was 86.36 with t-value=8.14 where as group B was 95.23% with t-value=13.41. The percentage of relief in itching in group A was 78.87% with t-value=11 where as group B was 88.88 with t-value=10.85.

The results of both groups were statistically highly significant (p<0.001).

DISCUSSION

Fistula-in-ano is one of the uncomfortable diseases of the perianal region. In ancient period as well now a day it is most difficult to treat for these mighty disorders. Most of the scholars are research in fistula-in-ano in both wings *Ayurvedic* and modern. But in *Ayurvedic* method is more effective treatment for *Bhagandara* at present time.

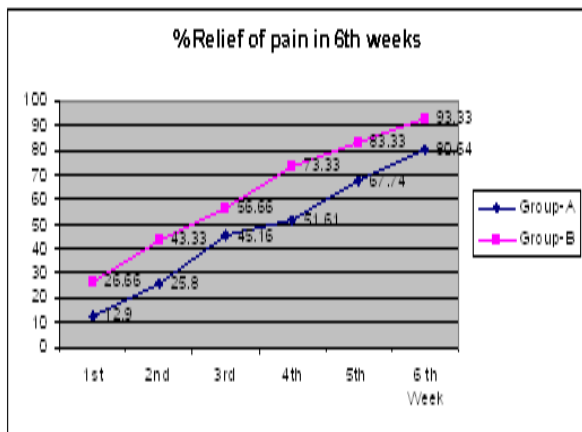
In fact, the thread techniques of treatment for fistula-in-ano are not quite a new invention. It is assumed that even Hippocrates around 460 B.C. by the name Apolinose, which had been developed later by Celsus. But the use of plain silk thread, which was enunciated by Hippocrates in due course of time give way to the use of rubber bands and other such parallel devices.

On drugs

For the present study, I have selected the drug against the *Tri-dosha*. Here *Kshara karma* of fistulous tracks has aggravated *Pitta dosha* so *Karanjadi Ghrita* has taken against the *Kshara karma* in *Bhagandara*. *Kshara karma* mainly enhances *Pitta dosha* and causes continuous pain & burning sensation, *Karanjadi Ghrita* is having *Pittahara* & *Dahashamaka* properties. Standard *Ksharasutra* is well known for debridement of unhealthy granulation tissues. *Ksharasutra* produces debridement of tissues all the three ingredients i.e. the proteolytic action of the latex, the caustic action of the *Kshara* and the anticeptic action of *Haridra*.

Haridra has a weak anticeptic and anti-histaminic property. In Ayurvedic view it has *Kaphahara*, *Vranashodhana*, *Ropana* and *Lekhana* properties, *Snuhi* is *ushna veerya* and *Haridra* is also *ushna veerya* and *Krimihara*. These properties are against the *Kapha* properties. So locally *Lekhana*, *Vranashodhana* and *Vranaropana* activity will takes place when we used the Standard *Ksharasutra*.

Discussion on pain



Graph 2: Relief of Pain in the 6th week study in both groups

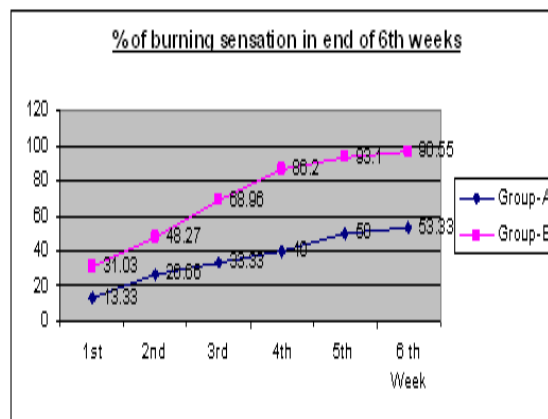
In group A & B patients the percentage of relief in pain in successive six weeks was as fallows.

In Group-A) it was 12.90%, 25.80%, 45.16%, 51.61%, 67.74% & 80.64%.

In Group-B) it was 26.66%, 43.33%, 56.66%, 73.33%, 83.33% & 93.33%.

The pain in fistula-in-ano is a chief complaint when there is collection of pus. The proper drainage of track may also help in relieving pain. Another major factor may be the presence of *Karanja*, *Jati*, *Patol*, *Manjistha*, *Daruharidra* are having the properties of *Chedana*, *Vranashodhan* and *Lekhana*. This will help in opening the tract. The other ingredients like *Nishoth*, *Kutki* & *Moma*, they are also doing *Chedana* and *Shodhan karma*, due to this the fibrosed material dissolve track remains open. When track remains open, there is no question of collection pus in the tract. Hence, there is a relief in pain in both Groups-A & B Another important factor is action of *Apamarga kshara*. This will enhance the action of *Chedana* & *Shodhana* karma of the wound. Moreover when there is a presence thread in the tract, the tract will remains always open. The above said all factors will help in reliving the pain. Most of drugs are having *laghu guna*, it makes *Ropana karma* because of this wound will heal. *Moma* makes *Sandhana karma*, the cavity of the wound fill up with granulation tissue.

Discussion on Burning sensation

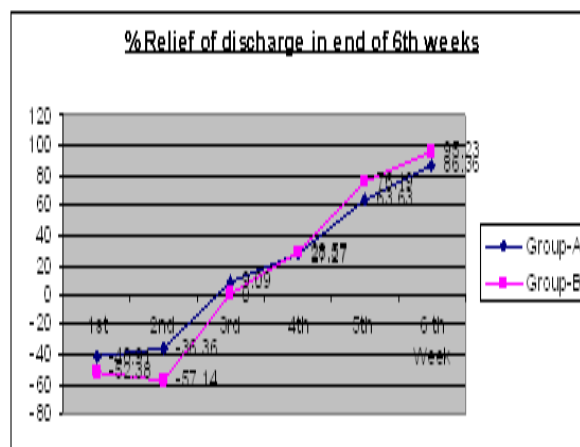


Graph 3: Relief of Burning sensation in the 6th week study in both groups

Percentage relief in burning sensation in group A was 13.33%, 26.66%, 33.33%, 40%, 50% and 53.33% at the end of sixth week, but in Group B patient’s percentage of relief on Burning sensation was 31.03%, 48.27%, 68.96%, 86.20%, 93.10% & 96.55 at end of sixth week.

This may be due to the Drugs of *Karanjadi Ghrita* in Group B. *Nimba*, *Mulethi*, *Priangu*, *Chandana*, *Ushir*, *Kustha*, *Jalvetasa*, *Kamal*, *Sariva*, *Krishnasariva*, *Kutaki*, *Moma* and *Ghrita* all are having *Sheeta veerya*. They are having *Vedanasthapana*, *Jantughna*, *Rakshogna*, *Putihara*, *Durghandhanashan* & *Dahaprashamana* properties. This will enhance the action of *Pittahara* & *Dahaprashamana* karma of the Local application on the wound. So above said ingredients subsides the side effect of *Kshara karma* i.e. burning sensation, redness due to *Sheeta veerya*.

Discussion on Discharge



Graph 4: Relief of Discharge in the end of 6th week study of both groups

The percentage relief of pus discharge in successive sixth weeks,

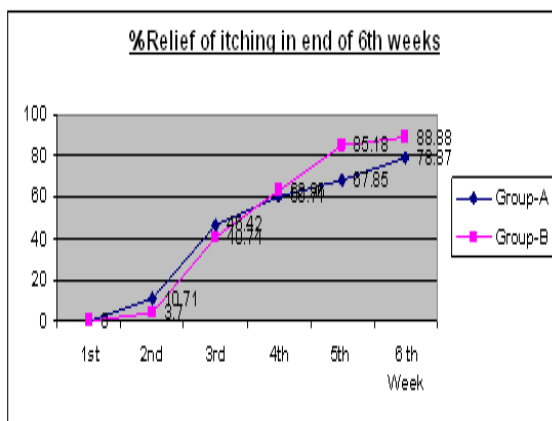
In Group-A it was; -40.91%, -36.36%, 9.09%, 27.27%, 63.63% & 86.36%.

In Group-B it was; -52.38%, -57.14%, 0%, 28.57%, 76.19% & 95.23%.

Both groups increase the pus discharge in first two weeks because of *Apamarga Kshara*. It is having the properties of *Chedana*, *Bhedana*, *Shodhana* and *Lekhana*. This will help in opening the tract. Due to this *karma* the fibrosed material dissolve track remains open so first two weeks enhance pus discharge. When track remains open, there is no question of collection pus in the tract. Moreover when there is a presence thread in the tract, the tract will remains always open.

Due to the *Shodhana*, *Vranaprasadana*, *Putihara*, *Jantughna* and *Ropana* property of ingredients of *Karanjadi Ghrita* and *Apamarga kshara* leads to decrease in discharge in Group B when compared to Group-A. This will trim down the severity of infection and serves as supporter in decreasing pus discharge.

Discussion on Itching



Graph 4: Relief of Itching in the end of 6th week study of both groups

The percentage of relief of itching in successive six weeks is as follows.

In Group-A it was 0%, 10.71%, 46.42%, 60.71%, 67.85% & 78.87%.

In Group-B it was 0%, 3.70%, 40.74%, 62.96%, 85.18% & 88.88%.

On the basis of percentage relief of itching, it is very much evident that the *Karanjadi Ghrita* & *Apamarga ksharasutra* is more efficient in relieving itching than standard *Ksharsutra*. This is may be due to the anti-allergic, anti-bacterial and *Tridoshahara* properties of *Karanjadi Ghrita*.

Itching will be usually duo to increase in *Kapha*. The *Apamarga Ksharsutra* and *Karanjadi Ghrita* are having *Tridoshahara* properties. Hence there is reduction in itching in Group-B when compared to Group-A.

Discussion on average Unit Cutting Time (U.C.T.)

In this clinical study the average Unit cutting time were observed that the (**patient 1**) whose initial length of track was 5cm. and cutting time 37 days and their UCT was 7.4days/cm; in this way the (**patient 2**) was 4cm. with 32days and UCT was 8 days/cm; the (**patient 3**) was 10cm. length with 81 days and UCT was 8.1 days/cm ; the (**patient 4**) was 7 cm. length with 59 days and UCT was 8.43 days/cm; the (**patient 5**) was 8 cm. length with 68 days and UCT was 8.5 days/cm; the (**patient 6**) was 12 cm. length with 106 days and UCT was 8.83 days/cm; the (**patient 7**) was 4.1cm.length with 31 days and UCT was 7.56 days/cm; the (**patient 8**) was 8.5cm. length with 68 days and UCT was 8 days/cm; the (**patient 9**) was 4.6 cm. length with 36days and UCT was 7.83 days/cm; the (**patient 10**) was 9.6cm. length with 75days and UCT was 7.81 days/cm; on the other hand their daily cutting measures were 0.2cm/day; 0.25day; 0.1cm/day; 0.14cm/day; 0.13cm/day; 0.08cm/day; 0.24cm/day; 0.12day; 0.22day; 0.10day;group A respectively. So in group A, the average UCT was 8.04 day/cm. where S.D. = 0.44 and S.E. = 0.14

In this way the study observed in **Group B** and noted that the (**patient 1**) whole initial length of track was 7.4cm. and cutting time 58 days and their UCT was 7.84days/cm, in this way the (**patient 2**) was 5cm.with 39days and UCT Was 7.8 days/cm; the (**patient 3**)was 4.3cm. length with 32days and UCT was 7.44 days/cm ; the (**patient 4**)was 5.8 cm. length with 44days and UCT was 7.59 days/cm; the (**patient 5**)was 8.2cm. length with 66days and UCT was 8.05 days/cm; the (**patient 6**)was 6.2 cm. length with 49days and UCT was 7.20days/cm; the (**patient 7**)was 5.9cm. length with 47days and UCT was 7.97 days/cm; the (**patient 8**)was 4.8cm. length with 39days and UCT was 8.13 days/cm; the (**patient 9**) was 9.2 cm. length with 80days and UCT was 8.69 days/cm; the(**patient 10**)was 3.0cm length with 24 days and UCT was 8 days/cm; on the other hand their daily cutting measures were cm/day; on the other hand their daily cutting measures were 0.14cm/ day; 0.2cm/ day; 0.23m/ day; 0.17cm/ day; 0.12cm/ day; 0.15cm/day; 0.17cm/day; 0.20 cm/day; 0.11 cm/day; 0.33 cm/day; in group B respectively. So in group B, the average UCT was 7.94 day/cm. where S.D. = 0.41 and S.E. = 0.13

Therefore in Group A & B where Standard *Ksharasutra* used, here U.C.T was very negligible difference. There was highly significant reduction in Pain, burning sensation, discharge and Itching

when compared to group A. The statistical values also proved it.

CONCLUSION

In this view of any dissertation, the research work in clinically study conducted by me can be concluded in following a few words-

1. Standard *Ksharasutra* and *Karanjadi Ghrita* are having wonderful effect on management of *Bhagandara*.
2. There was a marked reduction in Pain, Burning sensation, Discharge, itching and local reactions in treated group (B) as compared to control group (A).
3. The Standard *Ksharasutra* application is the unique procedure in the management of *Bhagandara* than other methods.
4. Post Application complications were found less in experimental medicine (*Karanjadi Ghrita*) along with Standard *Ksharasutra* as compare to only Standard *Ksharasutra*.
5. Unit cutting time of both groups is highly significant shown.
6. Wound healing after cut through was faster in treated group (1-2 weeks) as compared to (2-3 weeks) in control group.
7. No faecal incontinence was caused.

At the end of this clinical trial, it was found that both groups are efficient in management of *Bhagandara*, but *Karanjadi Ghrita* with Standard *Ksharasutra* (Gp.-B) can be considered as better than Group-A.

The study was carried out in less number of patients and hence the results obtained through this work will be having value only after confirmation by subsequent large sample multi-centered study.

REFERENCES

1. Charak Samhita – of Agnivesha ‘Vidyotani Hindi Vyakhya’ – Pt. Kashi Nath Shastri – 22nd edition, 1996 Ch. Chi. Ch. 12, p.377-378.
2. Dalhan – Sushruta Samhita (Tika), Nirnaya Sagar Press, Bombay, 1914.
3. Sushruta Samhita – Ayurved Tatva Sandeepika Hindi Commentary by Kaviraj Dr.Ambika Dutta Shastri, 11th edition, V.Samvant – 2066.Su.Ni.4/316-19 & Ch. 8/57-62.
4. Sushruta Samhita – English translation of Dalhana’s commentary along with critical notes – P.V.Sharma, 1st edition – 2000.
5. Sharma K.R. (1968) – Role of Ksharasutra in treatment of Bhagandaraa.
6. Synopsis of Surgery (Hey Grover’s)– Pub. Bristol; John Wright & Sons Ltd.16th edition 1963 p.559-560.
7. Hamilton Bailey’s –Demonstrations of Physical Signs in Clinical Surgery, 15th edition 1978, p.281-82.
8. Bailey and Love’s – Short practice of surgery, 22nd edition, 1995, p.879-882.
9. Manipal Manual of Surgery – by K. Rajgopal Shenoy, 1st edition reprint 2004, p.462-63.
10. Goligher – Surgery of the anus, rectum and colon, 3rd edition, p.209, London; Bailliere Tindall.
11. S.Das – A manual on clinical surgery, 4th edition, 1996.ch.5 p.55&ch.36 p.55
12. S.Das – A concise textbook of surgery second edition ch.54 p 1052-55.