ISSN 2456-432X SJIF: 5.896 JIF: 1.9127

IJOOAR

INDIAN JOURNAL OF ODYSSEY OF AYURVEDIC RESEARCH

MANAGEMENT OF LONG BONE FRACTURES WITH LAKSHA GUGGULU AND GANDHATAILA- A COMPARATIVE CLINICAL STUDY

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ABSTRACT

Fracture is a commonest issue now a days due to fall and rise in RTA cases. Mostly long bone get affected due to RTA and Fall. Bhagna is terminology given by our ancient Ayurvedic Acharyas which resembles as Fracture. There are multiple treatment modality explained by our acharyas to combat with fracture, Laksha Guggulu and Gandha taila are such drugs which helps in bone healing hence minimizes the time required for complete recovery after fracture. The aim of this study is to compare the effect of both laksha guggulu and Gandha taila in the Management of Bhagna W.S.R. to Long bone. Materials and methods- 30 patients of Simple Long bone Fracture were selected randomly for this study and divided in two groups, in Group A, 500 mg of laksha guggulu were given twice a day and in Group B- 10 drops of Gandha taila were administered twice a day for the duration of 45 days and followed up on 15th day, 30th day and 45th day of treatment to assess the efficacy of treatment. Results are documented clinically and studied statistically to draw the conclusion. Results- there was significant results seen in both the groups after 45 days of treatment on parameters like, Pain, Swelling, Tenderness, Shortening of limb, loss of Function of fractures site, visible callus on X-ray and Bone Trabeculation. But in group B, where Gandha taila were used Showed Slightly better results as compared to Group A.

INTRODUCTION-

Trauma is a major worldwide problem and one of the leading causes of death. Due to the widespread of industrialization and vehicles, incidences of accidents involving fracture and soft tissue injury is higher [1].

Fracture is a linear deformation or discontinuity of bone produced by forces exceeding modular elasticity [2]. Even ayurvedic texts have illustrated 'Fracture' as being the loss in the continuity of the bone due to pressure [3]. Fractures commonly result following accidents. However, the incidence of the long bones being fractured is higher and thus, demands special attention. A fracture is also often associated with pathological changes, bleeding, soft tissue injury and damage to the neurovascular structure [4].

The management of long bone fracture runs through the basic principle of fracture management i.e. reduction, immobilization and rehabilitation. The entire management is supported by antibiotics, NSAID, corticosteroids and calcium salts. Besides, the management often fails and leads to complications such as AVN, osteoarthritis, mal- union, etc [4].

The father of surgery 'Acharya Sushruta' also has quoted the treatment of fracture as Reduction [5], Immobilization [5], and Rehabilitation [5]; which is yet practiced by modern orthopedic surgeons. Moreover, a number of Ayurvedic compound drugs are mentioned in the context of fracture management to promote union. In this study Laksha guggulu [6] and GandhaTaila [7] were studied for their efficacy in Bhagna. Both Lakshadi Guggulu and Gandha Taila are having Asthasandhana Property, hence a comparative clinical study was planned to establish a better treatment modality in the management of long bone fracture.

Aims and Objective-

- **To study the literature of Bhagna and corelate it with the modern condition Long Bone Fracture.**
- To compare the efficacy of Laksha guggulu and gandha taila in the management of Long bone fracture
- To find out newer treatment drug for the management of Long Bone Fracture for early healing of bone.

MATERIALS AND METHODS-

30 patients with simple long bone fracture, without any chronic osteogenic pathology were selected for this study from OPD department of Shalya Tantra Vaidya Yagya Dutt Sharma Ayurveda Mahavidyalaya, Khurja. All the 30 patients were divided into 2 trial groups, viz. Group A (15 patients), Group B (15 patients),

Simple Random Sampling Procedure was adopted for the selection of patients of each group under study, keeping in view- the selection criteria It is a Randomized open comparative clinical trial, undertaken to evaluate the effectiveness of two trail drugs.

Selection criteria of the patients:

Inclusion criteria:

1. Patients with clinical features of Simple long bone fracture.
2. Both male and female patients.
3. Patients age between 15 to 60

Exclusion criteria:

1. Patients below age 15 and above 60
2. Patients with compound, Comminuted, and Displaced fracture which need ORIF.
3. Patients with nerve and vessel injury.
4. Patients suffering with any other debilating disease.
5. Any Osteogenic or Chronic pathology.
6. Patients with other systemic diseases, e.g., HTN, Asthama, DM, etc.

GENERAL MANAGEMENT OF FRACTURES IN PATIENTS FOR THE STUDY:

- The primitive management of fracture was initially done as by the classical method (Reduction, Retention and Rehabilitation).
- The reduction of the fractured bone was done by closed reduction method, under general anaesthesia (if necessary).
- After reduction, immobilization was done by using POP cast.
- Immobilization was advised until the union of the fractured bone.

MANAGEMENT OF FRACTURES IN GROUP-A (Trial 1):

Drug used: laksha Guggulu.

Drug Dosage: 500 mg BD of laksha guggulu aftet food with GoDugdha as Anupana.

Preparation method: laksha guggulu was prepared with reference from Bhaisajya Ratnvali, Bhagna Rogadhikara. All the ingredients were collected from the local market, and fresh drug collected from herbal garden attached to VYDS Ayurveda Mahavidyalaya, Khurja after proper identification from Dravyaguna expert. Laksha Guggulu was prepared as per classical method of guggulu kalpa preparation under the guidance and presence of Pharmacy staff.

MANAGEMENT OF FRACTURES IN GROUP-B (Trial 2):

Drug used: Gandha taila.

Drug Dosage: 10 drops of gandha taila were given orally twice a day before food with Sukhoshna godugdha.

Preparation method: the taila was prepared with reference from Bhaishajya Ratnavali. All the ingredients for preparation of the oil were collected from the local market. The Gandha Taila was prepared in college pharmacy attached to VYDS Ayurveda Mahavidyalaya, Khurja with textual reference under direct supervision of Pharmacy staff.

INVESTIGATIONS:

X-Ray: X-ray films were taken on the 1st day, to diagnose the fracture, its type, its severity and prognosis. The follow-up X-ray films were taken on 15th, 30th and 45th day; to assess the callus formation, depending upon the clinical signs of healing. Laboratory Investigations: Blood: Hb%, TC, DC, ESR, Blood Sugar, Serum Creatinine; Urine: Albumin, Sugar, Microscopic examination were done to rule out the co-morbid conditions

and to assess the general condition of the patient. Blood serum calcium was also done, if needed, to assess the normal calcium metabolism.

Instruments and equipments used: the specified drugs in each group, the material used for POP casting, traction modalities (if necessary).

ASSESEMENT CRITERIA:

The assessment of the patients was carried out on each 15th day, from the initiation of the treatment.

To assess the efficacy of the trial preparation or improvement in the clinical symptom of the disease and different signs and symptoms were graded upon basis of severity. The changes in the gradation of each symptom were mentioned the research proforma.

SUBJECTIVE CRITERIA-

1. Pain
2. Tenderness
3. Crepitus
4. Loss Of Function

OBJECTIVE CRITERIA

1. Swelling
2. Shortening Of Limb
3. Callus Formation
4. Bone Trabeculi Formation

Grading of Parameters.

PAIN: was assessed by assessment criteria of Medical Research Council grading and scoring as:

G-1: No Pain.

G-1: Mild Pain (which does not interfere in normal functioning).

G-2: Moderate pain (which interferes with normal functioning but subsides on taking analgesics).

G-3: Severe pain (which interferes in the normal functioning and does not subside even after taking analgesics).

G-4: Unbearable, Incapacitating pain.

SWELLING: was assessed by measuring the circumference of the fractured limb and comparing with the normal limb.

G-0: No Swelling.

G-1: Swelling 0-1 cm.

G-2: Swelling 1-2 cm.

G-3: Swelling more than 2 cm.

CREPITUS: was assessed by the gentle movement of the proximal and distal part of the affected limb.

G-0: Absence of Crepitus.

G-1: Presence of Crepitus.

G-2 : Having signs of Fracture, but the patient is not allowing eliciting crepitus

TENDERNESS: was elicited on first day, by palpating site of fracture by using a thumb. Then, in consequent assessment on 15th day, 30th day and 45th day by Springing test.

G-0: No Tenderness. (Absent)

G-1: Tenderness on Firm Pressure. (Mild)

G-2: Tenderness on Touch. (Moderate)

G-3: Patient denies even to touch. (Severe)

SHORTENING: the Shortening was assessed by comparing the affected limb with the normal limb.

G-0: No Shortening.

G-1: Discrepancy < 1.5 cm

G-2: Discrepancy >1.5 cm

G-3 : Discrepancy > 3 cm

LOSS OF FUNCTION: the Loss of Function is to be assessed nearer to the joint.

G-0: Normal function.

G-1: Loss of function to some extent, in either proximal or distal joint.

G-2: Loss of function in either joint.

G-3: Loss of function to some extent in both (proximal and distal) joints.

G-4: Loss of function in both joints.

CLINCAL TEST OF HEALING:

CALLUS FORMATION: Callus formation can be assessed by X-ray radiographs.

G-0: Hard Callus.

G-1 : Soft Callus.

G-2: No Callus.

BONE TRABECULI FORMATION (MODELLING STAGE):

G-0: if Positive.

G-1: if Negative.

Observation-

Demographic Observations:

AGE

Table no. 1 Showing Incidence of Age in Both Groups

Age				%
	Group A	Group B	Total	
10-20	3	2	5	16.33
21-30	6	5	11	36.33
31-4-	4	2	6	20
41-50	1	3	4	13.33
<50	1	3	4	13.33

SEX:-

Table No. 2 Showing Incidence of Sex in both Groups

Sex				%
	Group A	Group B	Total	
Male	8	10	18	60
Female	7	5	12	40

OCCUPATION

Table No. 3 Showing Incidence of Occupation in Both Groups.

Occupation				
	Group A	Group B	Total	%
Student	4	5	9	30
farmer	1	3	4	13.33
labourer	2	0	2	6.66
Housewife	3	1	4	13.33
teacher	1	1	2	6.66
driver	2	2	4	13.33
retired	0	1	1	3.33
others	2	2	4	13.33

BONE INVOLVEMENT

Table No. 4 Showing Incidence of Bone Involved.

Bone involved				
	Group A	Group B	Total	%
Humerus	3	1	4	13.33
Femur	1	1	2	6.66
Radius	5	4	9	30
Ulna	3	3	6	20
Rad+ulna	1	1	1	3.33
metacarpal	2	3	5	16.66
Tibia	0	1	1	3.33
Fibula	0	1	1	3.33

INCIDENCE OF PAIN

Table No. 5 Showing Incidence of Pain after Fracture

Pain			Total	%
	Group A	Group B		
Absent	0	0	0	0
Mild	0	0	0	0
Moderate	2	2	4	13.33
Severe	5	4	9	30
Unbearable	8	9	17	56.66

INCIDENCE OF SHORTENING

Table No. 6 Showing Incidence of Shortening in Both Groups

Incidence of Shortening			Total	%
	Group A	Group B		
No Shortening	5	7	12	40
Discrepancy <1.5 cm	9	7	16	53.33
Discrewpancy >1.5 cm	1	1	2	6.66
Discrepancy >3 cm	0	0	0	0

INCIDENCE OF DEFORMITY

Table No. 7 Showing Incidence of Deformity

Incidence of Deformity				%
	Group A	Group B	Total	
Visible Deformity	5	4	9	30
palpable	5	8	13	43.33
No Deformity	5	3	8	26.66

INCIDENCE OF TENDERNESS

Table No. 8 Showing Incidence of Tenderness

Tenderness			Total	%
	Group A	Group B		
severe	8	7	15	50
moderate	6	7	13	43.33
Mild	1	1	2	6.66
Absent	0	0	0	0

Table No. 9 showing functioning of affected limb

Functioning			Total	%
	Group A	Group B		
Impaired	3	7	10	33.33
Limited	7	7	14	46.66
Intact	5	1	6	20

Table No. 10 Showing Incidence of Movement of Limb

Incidence of Movement of Limb	Group A	Group B	Total	%
Abnormal	8	10	18	60
Normal	7	5	12	40

RESULTS-

RESULT OF GROUP A:- LAKSHA GUGGULU

Table no 11. Table showing degree of severity of different sign / symptoms before and after treatment with Laksha Guggulu

Signs / Symptoms	Total no.	BT					15 days					30 days					45 days				
		G0	G1	G2	G3	G4	G0	G1	G2	G3	%	G0	G1	G2	G3	%	G0	G1	G2	G3	%
Pain	15	0	0	2	5	8	0	2	4	9	27.45	2	4	7	2	52.94	9	6	0	0	82.35
Swelling	15	0	2	5	8	0	2	4	9	0	38.89	4	9	2	0	63.89	10	5	0	0	86.11
Tenderness	15	0	3	6	6	0	0	9	6	0	36.36	6	7	2	0	66.67	13	2	0	0	93.94
Shortening	15	5	9	1	0	0	8	7	0	0	36.36	13	2	0	0	81.82	14	1	0	0	90.91
Loss of Function	15	0	6	8	1	0	2	8	5	0	28	6	8	1	0	60	13	2	0	0	92
Callus formation	15	0	0	15	0	0	1	14	0	0	53.33	7	8	0	0	73.33	14	1	0	0	96.67
Bone trabeculation	15	0	15	0	0	0	3	12	0	0	20	9	6	0	0	60	15	0	0	0	100

RESULTS OF GROUP B:- GANDHA TAILA

Table No. 12: Table showing degree of severity of different sign / symptoms before and after treatment with Group B (Gandha Taila)

Signs / Symptoms	Total no.	BT					15 days					30 days					45 days				
		G0	G1	G2	G3	G4	G0	G1	G2	G3	%	G0	G1	G2	G3	%	G0	G1	G2	G3	%
Pain	15	0	0	2	4	9	2	0	7	6	39.58	2	9	3	1	66.67	12	2	1	0	91.67
Swelling	15	0	1	8	6	0	3	7	5	0	53.13	9	6	0	0	84.38	15	0	0	0	100
Tenderness	15	0	1	7	7	0	2	9	4	0	54.55	11	4	0	0	90.91	15	0	0	0	100

Shortening	15	7	7	1	0	0	11	4	0	0	50	14	1	0	0	87.5	15	0	0	0	100
	15	0	7	8	0	0	7	8	0	0	66.67	14	1	0	0	95.24	15	0	0	0	100
Callus formation	15	0	0	15	0	0	0	14	1	0	46.43	13	2	0	0	92.86	14	1	0	0	96.43
Bone trabeculation	15	0	15	0	0	0	12	3	0	0	78.57	15	0	0	0	100	15	0	0	0	100

The above table reveals improvement before and after treatment with percentage of relief.

Comparison between the Groups with assessment parameters:

Table no. 13 Showing Relief in Pain in both groups on follow ups

Group	No. of Patients	% of relief in pain		
		15 days	30 days	45 days
Group A	15	27.45	52.94	82.35
Group B	15	39.58	66.67	91.67

Table no. 14 Showing percentage of relief in swelling om follow up study

Group	No. of Patients	% of relief		
		15 days	30 days	45 days
Group A	15	38.89	63.89	86.11
Group B	15	53.13	84.38	100

Table No. 15 showing Tenderness in follow up studies

Group	No. of Patients	% of relief		
		15 days	30 days	45 days
Group A	15	36.36	66.67	93.94
Group B	15	54.55	90.91	100

Table No. 16 Showing % of Relief in Shortening on Follow up

Group	No. of Patients	% of relief in Shortening		
		15 days	30 days	45 days
Group A	15	36.36	81.82	90.91
Group B	15	50	87.5	100

Table No. 17 Showing Relief in Loss function of fractured site

Group	No. of Patients	% of relief		
		15 days	30 days	45 days
Group A	15	28	60	92
Group B	15	66.67	95.24	100

Table no. 18 Showing Visible callus Formation on X-ray

Group	No. of Patients	% of relief		
		15 days	30 days	45 days
Group A	15	53.33	73.33	96.67
Group B	15	46.43	92.86	96.43

Table No. 19 Showing formation of Bone Trabeculation on X-Ray

Group	No. of Patients	% of relief		
		15 days	30 days	45 days
Group A	15	20	60	100
Group B	15	78.57	100	100

DISCUSSION-

Asthi bhagna (Fracture) is relatively a penalty to the human being having a finely architected skeleton, often related with complications such as non-union, malunion, avascular necrosis, shortening, etc. It also does sometimes, render inevitably to physical disability- by restricting the physical, social, economical and psychological aspects. If not managed properly, Fracture may also lead to permanent disability in the subject. The basic principles of Fracture management, heading by Reduction, Retention and Rehabilitation- which are explained elaborately in modern medical literature, were already described vividly in Ayurvedic compendia's many centuries before.

The aim of the management of a fracture patient is to minimize the immobilization period and early recovery with proper healing. In context of the present clinical study, the basic principles of fracture management were borne in mind, to avoid the complications. 30 patients were taken-in for the study. They were divided into two groups, viz. Group A- treated with Laksha Guggul, Group B- treated with Gandha Taila. Observations were made during and after the treatment, to find out the effective management amongst these, for the patient of Long Bone Fracture.

Out of the 30 patients, the observation showed that a maximum number of patients i.e. 11 fell in the age group 21-30; it is evident that a maximum number of the patients inflicted by fractures were amongst the teenage group, than the middle aged ones or the extreme ages.

Thus, it can be said- most sufferers are those who are engaged in daily outdoor activities.

Regarding the bone being involved in the fracture, it was observed that amongst the 30 patients under the trial study- a maximum number of 9 patients (30%) were inflicted with fracture of the Radius, followed by fractures of Ulna – 6 in number (20%), Metacarpals –5 in number (16.66%), Humerus 4 in number (13.33%), Femur – 2 in number (6.66%), Radius + Ulna, Tibia and fibula – each 1 in number (3.3%), So, it is observed that most patients suffered from injuries of the forearm; which are prone to be injured in a trauma, whilst trying to support body against the fall.

Regarding the observation of the number of patients presenting with Pain as a symptom, it was observed that- the Pain was Unbearable in 17 patients (56.66%), Severe in 9 patients (30 %), and Moderate in 4 patients (13.33%). In case of fractures, pain will almost always be associated with; the involvement of adjacent nerve fibers, as also any movement in between the fractured bone fragments leads to incapacitating pain.

Regarding the incidence of the number of patients presenting with Shortening as a symptom, it was observed that- No Discrepancy was seen in 12 patients (40%), Discrepancy < 1.5 cm is seen in 16 patients (53.33%), Discrepancy ≥ 1.5 cm is seen in 2 patients (6.66%). It can be discussed that the shortening seen- in course of the healing process depends upon the bone involved, as well as the physiological factors of the patients.

Regarding the incidence of the number of patients presenting with Visible Deformity as a symptom, it was observed that- the Deformity was Palpable in a maximum number of 13 patients (43.33%), it was Visible in 9 patients (30%), and No deformity was seen in 8 patients (26.66%). The deformity being

seen or being absent depends upon the severity of the trauma and the displacement of the fracture's segments.

Regarding the incidence of the number of patients presenting with Tenderness as a clinical sign, it was observed that- the tenderness was Severe in 15 patients (50%), Moderate in 13 patients (43.3%), and Mild in 2 patients (6.66%). With swelling being present due to injury to the softer tissues around the bone fragments, tenderness is always elicited in the fractured limb depending upon the extent of bone thickness being involved and th e soft tissue around the fracture being involved.

Regarding the incidence of the number of patients having loss in functioning of the Limb, it was observed that- the functioning of the Limb was Impaired in 10 patients (33.33%), Limited in 14 patients (46.66%), and Intact in 6 patients (20%). Improper alignment in between the bone fragments, along with the swelling being present around the limb- does lead to alterations in the functioning of the limb.

Regarding the incidence of the number of patients presenting with alterations in the Movements of the Limb, it was observed that- Abnormal movement of Limbs was seen in 18 patients (60%); whereas it was Normal in 12 patients (40%). Improper alignment in between the bone fragments associated with the pain and swelling around the limb- does lead to abnormal movements of the limb.

In Group A relief in Pain after 15 days were 27.45%, whereas after 30 days the relief was 52.94 % and after completion of 45th day total relief was 82.35%/

In Group B, where patient treated with Gandha Taila Showed 39.58% relief in pain after 15-day, 66.67 % relief in 30 days and 91.67 % relief on 45th day. Test of significance showed that treatment in both the groups was Highly Significant to reduce pain with P-value < 0.001 in AT1, AT2 & AT3. Relief from pain is seen relatively faster in Group B than in other groups. In group A Relief in swelling after 15 days were 38.89 %, whereas after 30 days the relief was 63.89 % and after 45 days of treatment the relief in swelling were 86.11 % for patient who got treated with laksha Guggulu

In Patients treated with Gandha Taila, the relief in swelling were 53.13 % after 15 days which became 84.38% after 30 days and after 45 days 100 % reduction in swelling were achieved in Group B

Results in both groups were statistically significant. Results in group B where patient received Gandha taila had better result as compared to laksha Guggulu in swelling

In Group A where patients received Laksha Guggulu Showed 36.66 % relief in Tenderness after 15 days, after 30 days 66.67 % relief was achieved and after 45 days 93.94 % relief were seen.

In Group B the relief in tenderness were 54.55 % and after 30 days it was 90.91 % and after 45 days 100% relief were seen.

Hence in both groups there is statistically significant results were seen, but Gandha taila showed slightly better results than laksha Guggulu in case of Tenderness.

In Group A where patients received laksha Gugulu showed 36.36 % relief after 15 days, whereas after 30 days the relief were 81.82. after 45 days, the relief observed was 90.91 %

In group B where patients received Gandha taila showed 50 % relief after 15 days, 87.5 % relief after

30 days and 100 % relief after 45 days of treatment.

Though both groups have showed significant relief in Shortening, Group B has showed better results than Group A.

In case of relief in loss of function in affected site, after 15 days 28% relief were achieved, after 30 days the relief was 60% and after 45 days, 92 % relief was seen.

In group B, relief in loss of function were 66.67 % after 15 days and after 30 days, 95.24 % relief was seen and after 45 days 100 % relief was achieved.

Both group showed significant improvement in loss of function of fractured limb, but group B showed slightly better results than Group A

In group A 53.33 % patients showed Visible callus formation on X-ray, After 30 days, 73.33 % patients showed Callus formation and after 45 days, 96.67 % patients showed visible callus formation on X-ray

In group B 46.43 % patients showed visible Callus formation after 15 days, and 92.86 % patients showed Callus Formation and after 45 days, 96.43 % patients showed visible callus formation on X-Ray.

Group A Patients, where Laksha Guggulu was given, 20% of patients showed Bone trabeculation after 15 days, 60 % of patients showed trabeculation after 30 days, and all 100% patients showed Bone trabeculation after 45 days

In Group B, where Gandha taila was given, 78.57 % patients showed Bone trabeculation after 15 days while all 100 % patients showed bone trabeculation after 30 days only.

Here both groups showed bone trabeculation significantly, but in Gandha taila group, Bone trabeculation is faster as compared to laksha Guggulu group.

The comparative criteria for assessment of Healing in both groups on X-Ray

The statistical analysis shows that in case of 'Springing' test after 45 days- % of patients with positive signs in group A was 20 % and in group B was 6.67 %. The % of patients with negative signs in group A was 80 % and in group B it was 93.33 %.

The statistical analysis shows that in case of 'Pain on Angulation' test after 45 days- % of patients with positive signs in group A was 20 % and in group B it was 6.67. The % of patients with negative signs in group A was 80 % and in group B was 93.33 %.

The statistical analysis shows that in case of Tenderness on Fracture site after 45 days- % of patients with positive signs in group A was 3 % and in group B was 6.67 %. % of patients with negative signs in group A was 80 % and in group B, was 93.33 %.

The statistical analysis shows that in case of Visible callus on X-ray after 45 days- % of patients with positive signs in group A was 93.33 % and in group B was 93.33 %. % of patients with negative signs in group A was 6.67 % and in group B was 6.67 %.

The statistical analysis shows that in case of Formation of Bone trabeculi after 45 days- 100 % of the patients in both the group's elicited positive signs of healing.

CONCLUSION-

After the clinical observation and statistical evaluation- the following conclusions were drawn.

- The incidence of Fractures was found to be more in age group of 21 to 40 years.
- The present study proved that, after statistical analysis group B wherein Gandha Taila were used, showed highly significant effect as compared to laksha Guggulu, the drug used in Group A.
- Both the drugs are cost effective, can be easily prepared and can be easily administered without any significant complication incidences after treatment.

The hypothesis behind the study was found to be correct. The clinical study was conducted on a limited number of patients, it may not be claimed as final, detail study on a large sample size may be conducted in this regard to evaluate the efficacy of Laksha Guggulu and Gandha taila so that it may be proved useful and an effective approach in the management of Bone fractures.

REFERENCES-

1. Sabiston's textbook of Surgery – 16th edition, Ahercourt Publisher International Company.
2. Dr.J.C.Pal, Current Surgery, New Central Book Agency (P) Ltd, Calcutta, Published- 1996, Chapter 36, pg 400.
3. Shabd Kalpadrum, 3rd part, Nag Publishers, Delhi, 1987, pg 474.
4. J.Maheshwari- Essential Orthopaedics, 2nd edition, 2000, 18th Chapter, Interprint, New Delhi, pg 111.
5. Prof. Srikanth Murthy K.R, Sushruta samhita, Chikitsa Sthana, part 2, 3rd Chapter, 2nd edition 2004, Chaukhamba Sanskrit Bhavan, Varanasi, pg 44-45.
6. Govinda Das Sen,Bhaisajya Ratnavali, Abmikadatta shastri, Chaukhamba Sanskrit sansthan,15th edition.49/12, page no.602
7. Govinda Das Sen,Bhaisajya Ratnavali, Abmikadatta shastri, Chaukhamba Sanskrit sansthan,15th edition.49/12, page no.602-603