



AN INTEGRATIVE APPROACH IN THE MANAGEMENT OF ACL INJURY THROUGH AYURVEDA AND PHYSIOTHERAPY- A CASE REPORT

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ABSTRACT:

The knee joint is a synovial hinge joint pivotal to human locomotion and stability. Comprising intricate articulations between the femur, tibia and patella. It facilitates complex movements, from flexion and extension to rotation. Knee ligaments are commonly injured due to indirect forces, such as twisting or bending of the knee, or rotational movements of the joint. Among these ligaments, the anterior cruciate ligament (ACL) is particularly important as it primarily prevents excessive forward movement of the tibia relative to the femur. Additionally, it contributes to the stability of the knee joint in both frontal and transverse planes. Injury to the ACL, whether through trauma or overuse, can compromise knee stability and function, often requiring surgical intervention and rehabilitation to restore optimal joint function. In the conventional treatment regimen, options like exercises, braces, lifestyle changes, and surgeries, including graft fixation, are utilized. Surgical procedures may result in complications such as post-operative stiffness and pain. These complications can impact mobility and overall quality of life, Ayurvedic treatment modalities like Snehana (oleation), Swedana (sudation), Basti Karma (medicated enema), Upanaha (local application) etc. have demonstrated notable improvements in reduction of pain and restricted movement of right knee joint with a particular emphasis on delaying the onset of osteoarthritis. The present study concludes that the integrative approach of Ayurveda and Physiotherapy helps to manage ACL injury.

Key words: Anterior Cruciate Ligament (ACL) Injury, Ayurvedic treatment, Panchakarma, Physiotherapy

1. INTRODUCTION

The knee is the largest and most complex condylar synovial joint of the body. The complexity is the result of fusion of three joints in one . It is formed by fusion of the lateral femorotibial, medial femorotibial, and femoropatellar joints. Cruciate ligaments are very thick and strong fibrous bands, which act as direct bonds of union between tibia and femur, to maintain anteroposterior stability of knee joint.[1]

Anterior cruciate ligament begins from anterior part of intercondylar area of tibia, runs upwards, backwards and laterally and is attached to the posterior part of medial surface of lateral condyle of femur.[2] The anterior cruciate ligament is more commonly damaged than the posterior. It may be injured through trauma or overuse or in violent hyperextension of the knee or in anterior dislocation of the tibia. The injury may vary from simple sprain to complete tear. Patient may present with pain, swelling, local tenderness, hemarthrosis, sprain and strain. Tear of the ligaments leads to abnormal anteroposterior mobility.

Injury to the ACL, can compromise knee stability and function, often requiring surgical intervention and rehabilitation to restore optimal joint function. In the conventional treatment regimen, options like braces and surgeries, including graft fixation, are utilized. Surgical procedures may result in complications such as post-operative stiffness and pain. These

complications can impact mobility and overall quality of life.

Ayurveda the ancient wisdom is considered as one of the oldest of the traditional system of medicine accepted worldwide. An effort has been made to manage ACL injuries based on treatment of *Abhighataja Janusandhigata vata* . The treatment protocol comprises of *Janu Basti, Janu Upanaha, Basti karma, Sthanika abhyanga and parisheka* along with physiotherapy and internal medications. Here is a case study where successful management of ACL injury through the integrative approach of Ayurveda and Physiotherapy.

2. Case Report

2.1. Clinical findings:

A 25 year old male presented with complaints of pain in the right knee joint associated with Restricted range of movement (Painful flexion) in the last 6 months. History of present illness revealed that patient was apparently normal 6 months back. then he had an alleged h/o fall from a two wheeler and got injured over the right knee joint then developed severe pain and localised swelling over the joint for which he consulted nearby allopathic hospital and diagnosed with complete tear of ACL of right knee joint and underwent conservative management with immobilization by POP for 2 weeks along with analgesics from which he got temporary relief, after a duration of 6 months, pain got aggravated which was diffuse in nature associated with restricted movements(flexion

and extension) which impacted on his routine activities and job. For these complaints patient got admitted in Sri Dharmasthala Manjunatheshwara Ayurveda Hospital Bengaluru. Demographic details of the Patient are mentioned in (Table I), other History was taken with the Patient's informed consent (Table II). Examinations according to Ayurveda (Table

III) and Modern medicine (Table IV) was conducted to reach the final Diagnosis.

Demographic Details

Religion-Hindu

Occupation- Driver

Socioeconomic Status- Lower middle class

Marital State- Unmarried

Table 1: Other History of the Patient

Past Medical History	Not known case DM, HTN No previous injury over the affected joint
Past Surgical History	No surgical history
Family History	Nothing contributory
Personal History	Diet : Mixed Appetite : Good Sleep : Sound sleep Micturition : 4-5 times/day Bowel : 1-2 times /day

Right knee joint examination

Inspection

Scars present over the right knee joint

No visible swelling

No visible abnormalities

No valgus and varus deformity

Palpation

Pain- present, diffuse in nature: VAS score 2.5/10

Tenderness- absent

Swelling- absent

Crepitus

Audible- absent

Palpable- present

Range of movement

Painful restricted movement present at 45 degree angle of flexion.

Reflex- Intact

Special test related to knee joint

Anterior drawer test : positive

Posterior drawer test : negative

Lachmann's test : negative

Pivot shift : negative

Ashtavidha pariksha

Nadi (Pulse)- 74/min

Mutra (Urine)- *Samyak* (normal)

Mala (Stool)- *Samyak* (normal)

Jivha (Tongue)- *Aliptata*

Shabda (Speech)- *Spashta*

Sparsha (Skin)- *Anushna*

Drik (Eyes)- Prakruta

Akriti (Posture)- Madhyam

2.2 Diagnosis

*Abhighataja Janusandhigata vata (ACL Injury)
(Marmabhigata)*

2.3 Nidana Panchaka

2.3.1 Hetu (causative factors)

Abhighataja can be considered as *Nidana* since patient had an alleged history of fall.

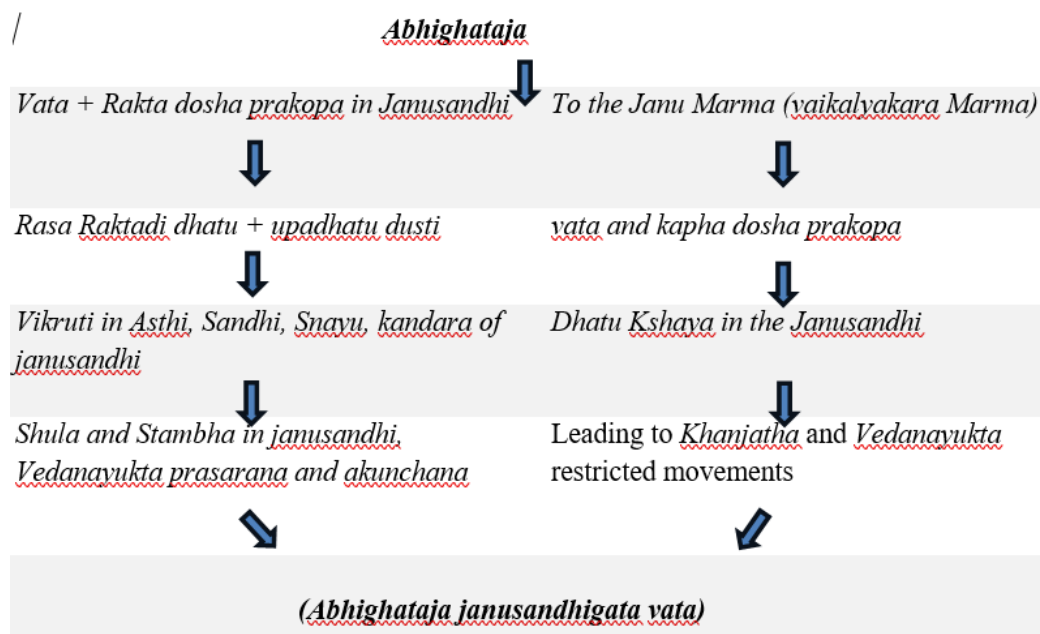
2.3.2 Purva Rupa (Prodromal symptoms)

Avyakta

2.3.3 Rupa (Manifestation)

*Shula and Stambha in janusandhi,
Vedanayukta prasarana and akunchana,
Shabdhapradurbhava in janusandhi*

2.3.4 Samprapti (Pathophysiology of disease)



Flow Chart no. 1: Samprapti

2.3.5 Sadhyaasadyatva (prognosis)

Yapya vyadhi .

(Manageable with repeated ayurvedic treatment modalities)

2.4 Investigations

MRI of the right knee joint was carried out

IMMEDIATE AFTER INJURY(11-12-2023)

(Fig.1&2)

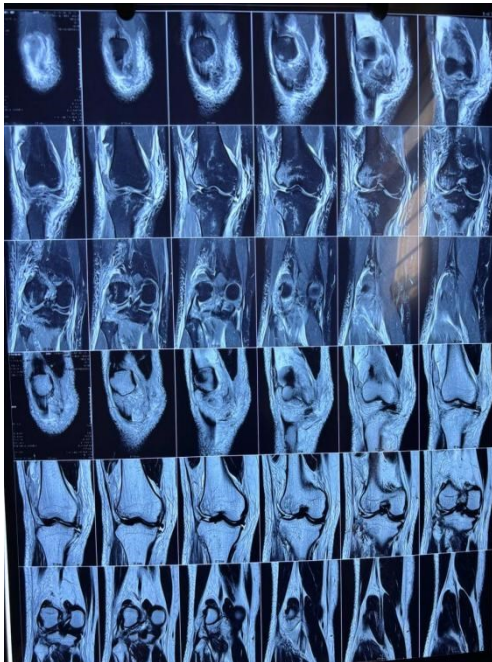
IMPRESSION:

- Complete tear of ACL.
- Flipped lateral meniscus as described

- Peripheral horizontal tear of body, posterior horn of medial meniscus.
- Grade II injury of MCL, grade I injury LCL.
- Minimal joint effusion with moderate suprapatellar air collection with adjacent extensive soft tissue oedema noted.
- Mild pre, superficial infrapatellar bursal collection with adjacent extensive soft tissue oedema
- Mild comminuted displaced fracture of lateral condyle of tibia with associated

multiple small fracture fragments of varying sizes in and around knee joint as described.

- Mildly displaced fracture of inferio-medial aspect of medial facet of patella with associated near complete tear of



patellar attachment site of medial patellar retinaculum

- Small area of subchondral fracture associated mild depressive component noted involving lateral femoral condyle - Grade II osteochondral injury

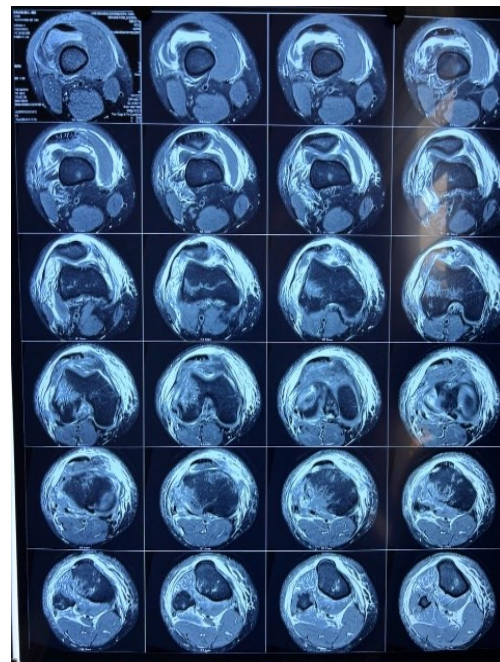


Fig.1 & Fig.2

BEFORE STARTING PANCHAKARMA

TREATMENT (08-05-2024) (Fig.3&4)

IMPRESSION:

- Mild right knee joint effusion with supra-patellar extension noted.
- Old fracture of the lateral tibial plateau and medial patellar facet noted.
- Few tiny loose bodies noted in the knee joint.
- Sub-chondral defect noted in the lateral femoral condyle.

- Complete tear of the anterior cruciate ligament noted.
- Grade I injury of the medial meniscus posterior horn noted.
- Grade II/III injury of the lateral meniscus anterior horn noted.
- Grade II injury of the lateral collateral ligament noted.
- Injury of the medial patellar retinaculum noted.

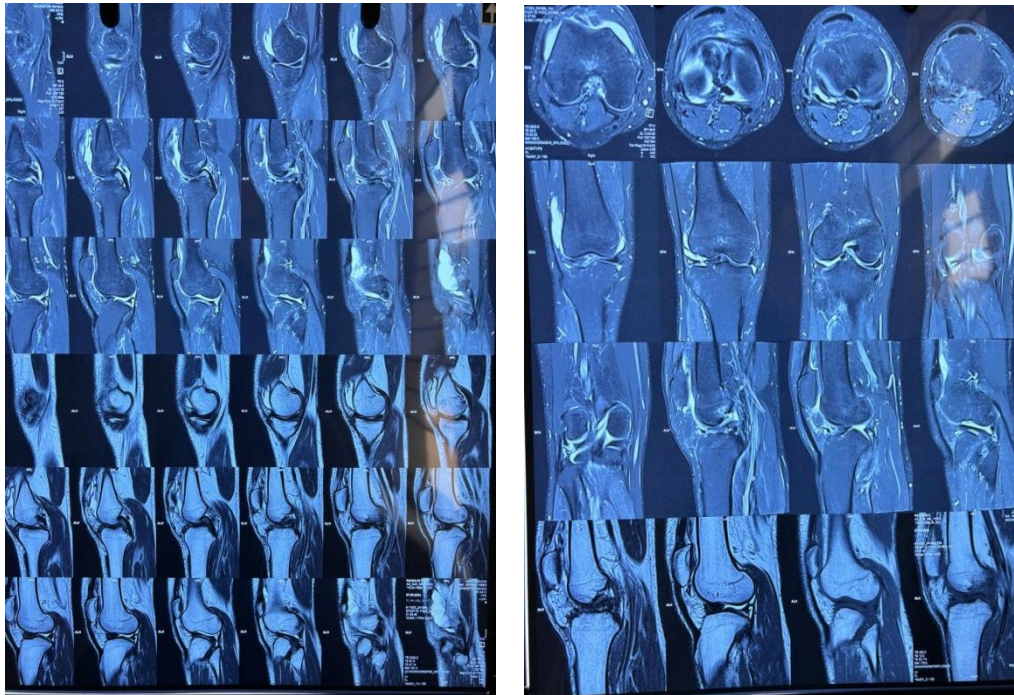


Fig.3 & Fig.4

Ligament healing will be assessed during next follow up through MRI with the consent of patient if willing.

2.5 Treatment given

Therapeutic intervention and oral medicines

The treatment approach was customized according to the patient's medical history, symptoms, and the particular *Dosha* and

Dushya involved in the disease presentation. An integrated treatment protocol was devised, combining Ayurvedic methods (including Basthi Chikitsa and Oral medications) with physiotherapy.

Table 2. Intervention timeline

Plan of care	Procedure	1-8 days
<i>Niruha Basthi</i>	<i>Rajayapana Niruha Basti</i> <i>Madhu -80ml, Saindhava- 5gm</i> <i>Sneha-moorchitha taila -80ml</i> <i>Rajayapana basti kalka-30gms</i> <i>Rajayapana basti Kashaya-200ml</i> <i>Mamsa rasa -100ml</i>	On 2nd,4th and 6th day.
<i>Anuvasana Basthi</i>	<i>Ashwagandha Ghrita-40ml</i> <i>Panchatikta Guggulu Ghrita -40ml</i>	On 1st ,3rd,5th,7th and 8th day
<i>Janu basti</i>	<i>Murivenna taila +Sandhilin</i>	✓
<i>Janu Upanaha</i>	<i>Patra and beeja of Dhatura</i>	
<i>Lower half body abhyanga+</i>	<i>Murivenna taila +dashamoola</i>	✓

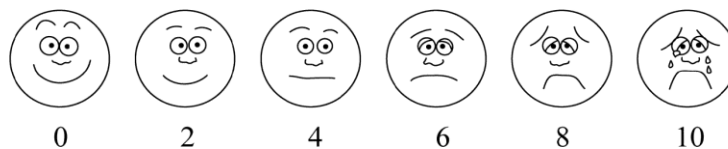
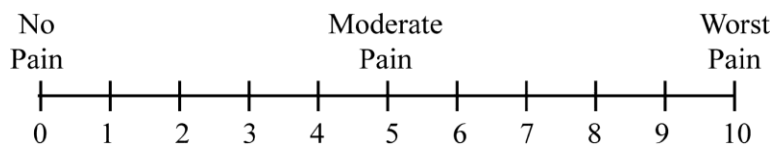
<i>parisheka</i>	<i>parisheka</i>	
Physiotherapy	IFT Right knee (20 mins) Exercises- Static quadriceps , SLR, Hip abduction, Calf stretch and Dynamic quadriceps with 1 kg wt.	✓
<i>Gokshuradi Guggulu</i>	One tablet after food thrice a day	✓
<i>Punarnava Mandoora</i>	One tablet after food thrice a day	✓
<i>Maharasnadi Kashaya</i>	10ml after food thrice a day with equal water	✓

3. OBSERVATIONS AND RESULTS

The following observations were made before and after the treatment

There was a significant reduction of pain was observed. **Range of movement: -5/10; AT- 1/10**

➤ Pain Assessment: (visual analog scale grading)2



Painful at 45 degree Angle of flexion

No pain even at 90 degree angle of flexion



Before treatment (Fig.5)



After treatment (Fig.6)

4.DISCUSSION

Anterior Cruciate Ligament injury can be considered as *Abhigata janusandhigata vata*

based on clinical signs and symptoms. According to *Susrutha Acharya*, *Janu Sandhi* is a *Vaikalyakara Marma* and injury to this *Marma* causes *Khanjatha*. The pathogenesis of the disease is as follows: due to *Abhighata* there will be *Rasa Rakthadi Dhatu Dushti* and *Vata Prakopa* which leads to *Vikruthi* in *Asthi*, *Sandhi*, *Snayu*, *Kandara* and causes the symptoms.

4.2 Effect of Panchakarma

4.2.1 Basti karma [3]

Basti (medicated enema) is one among the most important *Panchakarma* therapies which is also considered as “*Chikitsardha*” (half of entire treatments). It is possessed with multidimensional action. While we analyse each organ related to *Basti* are *Marmas*. *Marmas* are *PranaSthana*. *Prana* here means *Agnyadi MahaBhoota*. More over the *Marmas* related to *Basti* are *SadhyapranaharaMarmas*, they are *Agnimahabhootha* predominant .In *Marmas* four siras are present which help in the *Poshana* of *Snayu*, *Asthi*, *Mamsa* etc . As it was a critical condition leading to pain and restricted movement of the knee joint , but there were no signs of swelling, tenderness and hemarthrosis hence *Rajayapana Basti* was administered for the purpose to increase strength, *Brimhana* (Nourishment of *dhatu*), and *Rasayana* (rejuvenate). It's particularly effective for conditions caused by imbalances in the

Vata dosha leading to *Shula* and *Dhatukshaya*.

4.2.2 Janu Basti [4]

Janu Basti is a type of *Swedana*, and its action is similar to *Swedana karma* according to Ayurveda. Due to its *ushna* and *Snigdha guna*, *Janu Basti* helps to relieve pain(*shula*) and stiffness(*stambha*). According to *Sushrutacharya*, the *dravya* entered the body through *Romakupa* and circulated all over it [5]. After absorption, the medicated oil does *Vatashamana* due to their *vataghnaguna* and also helps to nourish the knee joint and helps in healing, which further helps to break the *samprapti*. According to modern science, *Swedana*(sudation) works by vasodilation, increasing blood circulation, absorption, and excretion of toxins through sweating.

4.2.3 Janu Upanaha [6]

Upanaha sweda is a mode of *Swedana* which has a great effect on pain & inflammatory conditions [7]. *Upanaha dravyas* are *vatahara* , *kaphahara* mainly acts on *twak* when applied as *lepa*. *Bhrajaka pitta* present in *twak* helps in absorption through *roma kooapa* where the *virya* of *lepa* enters into affected part helps in systemic absorption of drugs & hence the effect is observed. Where drug is mainly absorbed through transdermal route to the affected site.

Due to the heat vasodilation occurs in the superficial tissues. Stimulation of superficial nerve endings causes a reflex dilation of arterioles. By this process necessary oxygen & nutritive materials are get absorbed at the site. Also helps in muscle relaxation & improves muscle action. Increases the activity of sweat - glands, reflex stimulation of sweat glands stimulates the sensory nerve endings.

Dhatura Patra and *beeja* contain a variety of chemical compounds, predominantly alkaloids like atropine, scopolamine, hyoscyamine, flavonoids, tannins, coumarins etc. having anti-inflammatory and analgesic characteristics there was notable relieve of pain and stiffness. The range of motion was increased due to decreased intensity of symptoms.

4.2.4 Sthanika Abhyanga (Oleation) and Swedana (Parisheka) [8]

Snehana and *Swedana* helps with *Vatashamana*. In *Sthanika abhyanga* Applied oil penetrates through the skin and is absorbed due to *Swedana*, which increases local circulation and facilitates better absorption of the drugs used or procedures in *Panchakarma*. *Parisheka* also helps to reduce stiffness and pain because it relaxes muscles and provides symptomatic relief . It

promotes the proper function of *Vata dosha*.

4.2.5 Physiotherapy

It plays a major role in treating an ACL injury by Reducing Pain and Swelling, Restoring Range of Motion, Strengthening the muscles around the knee joint is essential for providing stability and support. Physiotherapy exercises targeting the quadriceps, hamstrings, and calf muscles can help to improve strength, prevent further injury and to simulate functional movements and activities. Main goal is to Prevent Secondary Complications.

5.CONCLUSION

Panchakarma treatment modalities like *Janu basti*, *Janu Upanaha*, *Basti karma*, *Sthanika abhyanga* and *parisheka*, and *Shamana Chikitsa* along with physiotherapy was done over a period of 8 days and the patient was advised for follow up after 15 days. The treatment modalities mainly focused over the pain management and improving the range of movement. There was a significant reduction of pain was observed , VAS score before treatment was 5 after treatment it was reduced to 1. Range of movement before treatment painful at 45 degree angle of flexion after treatment no pain even at 90 degree angle of flexion.

6. Declaration of patient consent

The authors confirm that they have acquired a patient consent form, in which the patient or caregiver has granted permission for the

publication of the case, including accompanying images and other clinical details, in the journal. The patient or caregiver acknowledges that their name and initials will not be disclosed, and sincere attempts will be undertaken to safeguard their identity. However, complete anonymity cannot be assured.

7. CONFLICT OF INTEREST

Conflict of interest is declared none

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