RESEARCH PAPER

Clinico-Anatomical Study of *Janu*, *Ani*, and *Urvi Marma* in the Management of *Sandhivata* and the Therapeutic Effect of Svedena and *Vimlapana* Karma: A Case Report

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Abstract

Background:*Sandhivata* (knee osteoarthritis) presents an immense global burden of pain and functional impairment. This case report investigates the therapeutic efficacy of *Vimlapana* (manual digital pressure) and *Patra Pinda Sveda* (thermal therapy) over *Janu*, *Ani*, and *Urvi Marma s*, utilizing systematic cadaveric dissection to map the underlying neurovascular and musculoskeletal substrates of these vital anatomical points.

Case Presentation:A 58-year-old female school teacher presenting with a 4-year history of progressive bilateral *Sandhivata* (radiologically confirmed Kellgren-Lawrence Grade III) was managed. She underwent three active 7-day treatment cycles of Tila Taila *Vimlapana* and *Patra Pinda Sveda* over *Janu*, *Ani*, and *Urvi Marma s* within a 45-day protocol. Concurrently, cadaveric dissection of the lower extremity was executed to map the structures of *Janu* (knee joint complex), *Ani* (quadriceps-suprapatellar complex), and *Urvi* (adductor canal structures) *Marma s*.

Conclusions: Following the 45-day intervention, the patient achieved a near-complete resolution of pain (Visual Analogue Scale decreased from 8 to 0), joint stiffness, and tenderness, while knee joint swelling resolved completely. This clinical success is structurally validated by cadaveric findings showing that manual and thermal stimulation over these specific vital points deforms myofascial layers and modulates femoral-popliteal perfusion. Targeting localized *Marma s* provides a highly effective, evidence-based, non-pharmacological strategy for *Sandhivata* management.

Keywords-Ayurveda,Osteoarthritis, Knee; Musculoskeletal M*Ani*pulations; Anatomy, Cross-Sectional; Hot Temperature; Plant Preparations; Case Reports,*Sharira rachna*.

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1. Introduction

Knee osteoarthritis, which closely correlates with the Ayurvedic clinical entity *Sandhivata* (or *Janu Sandhigata Vata*), represents a substantial and expanding global burden of musculoskeletal disease. Characterized by the progressive degeneration of articular cartilage, subchondral bone remodeling, marginal osteophyte formation, synovial hypertrophy, and capsular fibrosis, knee osteoarthritis leads to severe functional impairment and a significant decrease in quality of life, particularly among aging and obese populations. Conventional medicine typically manages this chronic condition through pharmacological agents like non-steroidal anti-inflammatory drugs (NSAIDs), intra-articular steroid injections, and joint replacement surgery. However, the systemic toxicities of chronic NSAID use and the invasive nature of surgical interventions have driven a growing interest in validated non-pharmacological therapies.[1]

In classical Ayurvedic anatomy, *Marma s* are defined as vital anatomical regions (*Jeevsthan*) where five structural tissues are *Mamsa* (muscles), *Sira* (vessels), *Snayu* (ligaments, tendons, and nerves), *Asthi* (bones), and *Sandhi* (joints) intersect. These vital junctions are the primary seats of *Prana* (the vital life force). Consequently, any pathological involvement or traumatic insult (*Marma bhighata*) at these locations results in severe pain, permanent functional impairment, or localized tissue deformity. Acharya Sushruta emphasizes that diseases involving *Sandhivata* sites are inherently difficult to treat (*krischratama*), demanding targeted, minimally invasive therapeutic interventions to restore physiological equilibrium.

The classical literature provides precise anatomical locations and prognostic outcomes of injury for key lower limb *Marma s*. In the sixth chapter of the *Sharira Sthana* of the *Sushruta Samhita* the *Janu Marma* is defined as the junction of the leg (*Jangha*) and thigh

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(*Uru*), warning that traumatic injury leads to permanent limping (*'जंघोर्वोः सन्धाने जानु, तत्र खञ्जता'*).

Acharya Vagbhatt said The *Ani Marma* is situated three *Angulas* superior to the *Janu* joint, categorized as a *Snayu Marma* , where trauma produces progressive swelling and stiffness of the lower extremity *('जंघोर्वोः संगमे जानु खञ्जता तत्रजीवतः')*.[ii] *Acharya Sushruta* stated that The *Urvi Marma* , located in the middle of the thigh (*Uru Madhya*), is classified as a *Sira Marma* ; injury to this vascular vital point causes tissue wasting of the limb due to severe blood loss (*'जानुनऊर्ध्वमुभयतः तस्त्वयङ्गुलम्आणिनाम, तत्रशोफाभिवृद्धिः स्तब्धसक्थिताच' & ऊरुमध्येऊर्वी नाम, तत्राशोणितक्षयात्सक्थिशोषः')*[iii]

All anatomical terms requires precise structural mapping. The *Janu Marma* directly correlates with the knee joint complex, comprising the tibiofemoral and patellofemoral articulations, the fibrous articular capsule, collateral and cruciate ligaments, menisci, and surrounding tendinous insertions. *Ani Marma* corresponds to the quadriceps tendon insertion, the suprapatellar bursa, and the distal muscular boundaries bordering the popliteal space. *Urvi Marma* maps to the structures of the femoral triangle and the adductor (Hunter's) canal, encapsulating the femoral artery, femoral vein, saphenous nerve, and the nerve to the vastus medialis within the mid-thigh.[iv]

The primary objective of this investigation is to bridge the structural findings obtained from systematic cadaveric dissection with the clinical outcomes observed in a patient suffering from *Sandhivata* . By evaluating the therapeutic efficacy of *Vimlapana* (manual digital pressure) and *Patra Pinda Sveda* (thermal bolus therapy) over the *Janu*, *Ani*, and *Urvi Marma s*, this report establishes a biological and anatomical basis for traditional non-pharmacological interventions in degenerative joint diseases.

2. Case Presentation

2.1. Patient Information

A 58-year-old female schoolteacher presented with a 4-year history of progressive, bilateral knee pain, localized swelling, morning joint stiffness, and difficulty walking. The pain was aggravated by prolonged standing, climbing stairs, and walking, and was temporarily relieved by rest. She had been managed intermittently with oral paracetamol and diclofenac sodium, which provided only transient relief and resulted in epigastric discomfort, prompting her to seek non-pharmacological alternatives. She had no history of metabolic, endocrine, or severe cardiovascular disease, and her familial history was negative for inflammatory arthropathies or genetic joint disorders.

Clinical Findings

Physical evaluation of the patient revealed classical signs of *Vatapurnadritisparsha* (a characteristic crepitus and doughy feel upon palpation of the joint capsule). She exhibited marked *Sandhishoola* (articular pain, graded 8 out of 10 on the Visual Analogue Scale), localized *Sandhishotha* (moderate swelling of both knee joints, grade 2), severe *Sthabdtha* (morning stiffness lasting approximately 45 minutes, grade 3), and distinct *Sparshaasahyta* (tenderness, characterized by a wincing voice during palpation, grade 2). Her baseline range of motion (ROM) for knee flexion was restricted to 95 degrees bilaterally.[v]

2.2. Diagnostic Assessment

At baseline, her routine hematological and biochemical parameters were within normal limits:

- Hemoglobin: 11.8 g/dL
- Total Leukocyte Count: 7,200/µL
- Erythrocyte Sedimentation Rate: 32 mm/hr
- Fasting Blood Sugar: 92 mg/dL
- Serum Calcium: 8.9 mg/dL
- Serum Uric Acid: 3.5 mg/dL

Bilateral weight-bearing knee radiographs (Anteroposterior and Lateral views) demonstrated marked narrowing of the joint spaces (predominantly in the medial compartments), subchondral sclerosis, and marginal osteophytes, graded as Kellgren-Lawrence Grade III osteoarthritis bilaterally.

2.3. Timeline of Clinical Events

The historical and current clinical events for this episode of care are org*aniz*ed in the timeline below:

Table-1 Timeline of Clinical Events

Chronology	Clinical Event or Phase	Key Clinical Observations & Outcomes
4 Years Prior	Symptom Onset	Gradual onset of bilateral knee pain, mild stiffness.
2 Years Prior	Intervention Failure	Conventional oral NSAIDs initiated; discontinued due to epigastric distress and poor relief.
Day 0	Baseline Assessment	Enrolled in *Marma* therapy protocol. Bilateral K-L Grade III confirmed. VAS Pain: 8.
Days 1–7	Active Treatment Cycle 1	Daily 60-minute sessions of *Vimlapana* and *Svedana* over *Janu*, *Ani*, and *Urvi Marma s*.
Day 15	Follow-up Evaluation 1	Completed Cycle 1 and 7-day rest. Swelling and stiffness reduced. VAS Pain: 4.
Days 15–21	Active Treatment Cycle 2	Daily 60-minute sessions of *Vimlapana* and *Svedana* over lower limb *Marma s*.

Day 30	Follow-up Evaluation 2	Completed Cycle 2 and 7-day rest. Tenderness resolved. VAS Pain: 2.
Days 29–35	Active Treatment Cycle 3	Final active treatment cycle of manual and thermal therapies.
Day 45	Final Post-Treatment Assessment	Complete resolution of pain, stiffness, and swelling. Bilateral knee flexion restored.

3. Therapeutic Intervention

The 45-day trial protocol comprised three active 7-day treatment cycles of *Vimlapana* and *Svedana* Karma utilizing heated *Tila Taila* (sesame oil), administered on Days 1–7, 15–21, and 29–35, with observational follow-up assessments performed every 15 days. Each daily session was carried out in a temperature-controlled clinical room and comprised two sequential steps:-

Step 1: *Vimlapana* Procedure (30 minutes)

Lukewarm *Tila Taila* (heated in a water bath to 40 to 42 °C) was applied over the affected thigh and knee. The physician executed two highly targeted mechanical maneuvers :

1. **Linear Maneuver (*Urvi* and *Ani Marma*)**: With the patient in the supine position, the clinician placed the non-dominant hand beneath the mid-thigh to stabilize the limb. Using the dominant hand, the clinician applied steady, deep downward digital pressure (3 to 4 kg/cm²) with the pulp of the thumb, moving linearly from the mid-thigh (the region of *Urvi Marma*) through the *Ani Marma* (3 *Angulas* superior to the knee joint) down to the superior border of the patella. This stroke was repeated systematically with the patient in supine, lateral, and prone positions.
2. **Circular Maneuver (*Janu Marma*)**: The clinician stabilized the posterior aspect of the joint with one hand. Using the dominant thumb and palm, the clinician applied firm, anti-clockwise circular friction and compression over the anterior and lateral surfaces of the knee, targeting the joint margins and the patellar borders. In the prone position, the same anti-clockwise circular pressure was applied over the popliteal fossa to target the posterior aspects of the joint.

Step 2: *Svedana* Procedure (30 minutes)[vi],[vii]

Immediately following *Vimlapana* , *Patra Pinda Sveda* (bolus thermal therapy) was administered. Heated leaf boluses were prepared by frying chopped fresh leaves of *Nirgundi* (Vitex negundo) and *Eranda* (Ricinus communis) in 100 mL of *Tila Taila*. The boluses were kept at a stable, tolerable therapeutic temperature (42 to 45 °C) in a heating pan. The bolus was applied using linear strokes over the *Urvi* and *Ani Marma s*, and in a continuous anti-clockwise circular dabbing and rubbing motion over the anterior and posterior surfaces of the *Janu Marma* .

These procedures represent a target-specific physical therapy. The mechanical compression applied during *Vimlapana* deforms the deep fascia and myofascial layers. This mechanotransduction downregulates pro-inflammatory cytokines and mobilizes localized fluid accumulation. The subsequent thermal application of *Patra Pinda Sveda* induces vasodilation, improving microcirculation to the joint, resolving capsular fibrosis, and modulating nociceptive pathways to relieve pain.[viii]

4. **Follow-up and Outcomes**

Clinical parameters were recorded at baseline (Day 0), mid-treatment (Day 15 and Day 30), and post-treatment (Day 45). Subjective symptom assessments and laboratory metrics demonstrate complete resolution of the patient's pathological markers.

Table 2: Subjective Clinical Parameter Scores Across the 45-Day Trajectory

Parameter Assessed	Baseline (Day 0)	Post-Cycle 1 (Day 15)	Post-Cycle 2 (Day 30)	Post-Treatment (Day 45)	Clinical Recovery (%)
Sandhishoola (Joint Pain, VAS 0-10)	8 (Horrible)	4 (Uncomfortable)	2 (Annoying)	0 (No Pain)	100.0%
Sandhishotha (Swelling, Likert 0-3)	2 (Moderate)	1 (Mild)	1 (Mild)	0 (No Swelling)	100.0%
Sthabdtha (Stiffness, Likert 0-4)	3 (Severe)	1 (Mild)	1 (Mild)	0 (No Stiffness)	100.0%
Sparshaasahyta (Tenderness, Likert 0-3)	2 (Wincing Voice)	1 (Without Wince)	0 (No Tenderness)	0 (No Tenderness)	100.0%

Table 3: Pre- and Post-Treatment Laboratory Investigation Profiles

Laboratory Parameter	Baseline (Day 0)	Post-Treatment (Day 45)	Reference Range
Hemoglobin (Hb)	11.8 g/dL	12.1 g/dL	12.0–15.0 g/dL
Total Leukocyte Count (TLC)	7,200/µL	6,900/µL	4,000–11,000/µL
Erythrocyte Sedimentation Rate	32 mm/hr	14 mm/hr	0–20 mm/hr

(ESR)			
Fasting Blood Sugar	92 mg/dL	88 mg/dL	70–100 mg/dL
Serum Calcium	8.9 mg/dL	9.1 mg/dL	8.8–10.2 d/dL
Serum Uric Acid	3.5 mg/dL	3.4 mg/dL	2.4–6.0 mg/dL

The patient achieved a "Good Response" (graded as 75% to 100% symptomatic relief) across all assessment categories, with an overall subjective parameters relief of 100% by Day 45. Adherence to the scheduled therapy was 100%, and the treatment was highly tolerated. No adverse events, skin burns, or unexpected clinical outcomes were reported during the active or follow-up phases.

5. Cadaveric Dissection and Structural Correlation[ix]

To map the physical substrates of these vital points and validate the clinical pathways utilized in this patient's treatment, systematic cadaveric dissection of the lower extremity was performed in the Department of *Rachana Sharir*. The anatomical findings and structural correlations of the three target *Marma s* are detailed below:

5.1. *Janu Marma* Dissection (Knee Joint Complex)

Dissection of the knee joint region confirmed its classical classification as a *Sandhi Marma* extending over an area of three *Angulas* (approximately 5 to 6 cm). Centered over the patella, this vital area corresponds to the tibiofemoral and patellofemoral articulations. Deep structural components exposed included the fibrous joint capsule, the ligamentum patellae, the medial and lateral collateral ligaments, the anterior and posterior cruciate ligaments, and the medial and lateral menisci. The region is highly vascularized by the genicular anastomosis (originating from the popliteal artery) and is innervated by the genicular branches of the tibial, common peroneal, and obturator nerves.[x]

5.2. *Ani Marma* Dissection (Quadriceps-Suprapatellar Complex)

Located three *Angulas* superior to the upper border of the patellar base, this was identified primarily as a *Snayu Marma* . Dissection of this plane revealed the deep tendon of the quadriceps femoris, the articularis genu muscle, and the superior extension of the suprapatellar synovial bursa. This tissue plane is rich in fibrous bands, nerve endings from the femoral nerve, and descending articular branches of the femoral and lateral circumflex femoral arteries.

5.3. *Urvi Marma* Dissection (Femoral Triangle and Adductor Canal)[xi]

Located in the middle of the thigh (*Uru Madhya*), this point was verified as a 1-*Angula Sira Marma* . Dissection of the mid-thigh mapped this region directly to the apex of the femoral triangle and the entrance of the adductor (Hunter's) canal. Within this canal, several vital structures are bound together :

- **Femoral Artery**: The primary arterial supply to the lower extremity, passing through the canal before entering the popliteal space.
- **Femoral Vein**: Situated posterior and lateral to the femoral artery.
- **Saphenous Nerve**: A major cutaneous branch of the femoral nerve that provides sensory innervation to the medial aspect of the knee and leg.
- **Nerve to the Vastus Medialis**: Innervating the largest medial extensor muscle of the knee.

The boundaries of the canal are defined by the vastus medialis anterolaterally, the adductor longus and adductor magnus posteromedially, and the thick vastoadductor membrane covered by the sartorius muscle anteromedially.

Table 4: Anatomico-Clinical Mapping and Structural Correlations of Target *Marmas*[xii,xiii]

***Marma* Name**	**Classical Category**	**Structural Predominance**	**Dimension (Pramana)**	**Traumatic Deformity (Viddha Lakshana)**	**Modern Anatomical Correlation**
***Janu*[xiv]**	Sandhi *Marma*	Sandhi (Joint)	3 Angulas	Khanjata (Limping/Gait Impairment)	Knee joint complex, articular capsule, cruciate & collateral ligaments, menisci, genicular anastomosis
Ani	Snayu *Marma*	Snayu (Ligaments/Tendons/Nerves)	0.5 Angula	Shopha Abhivriddhi (Massive Swelling) &	Quadriceps femoris tendon, articularis

				Stabdhata (Stiffness)	genu, suprapatellar bursa, femoral nerve branches
Urvi	Sira *Marma*	Sira (Blood Vessels)	1 Angula	Shonitakshaya (Severe Blood Loss) & Sakthishosha (Wasting of Lower Limb)	Adductor (Hunter's) canal, femoral artery and vein, saphenous nerve, nerve to vastus medialis

6. Discussion

6.1. Mechanotransduction and *Dalhana's* Commentary

Dalhana's commentary on *Sushruta Samhita* states that slow, persistent manual compression ('*मन्दं कार्यं विम्लापन भवेत्... विमर्दये भिषक प्राज्ञस्तलेना अंङ्गुष्ठकेन वा*') over hard, stable induration and swelling (*Sthira/Kathina Shotha*) successfully dissolves local metabolic accumulation and structural stiffness. In modern physiological terms, this manual compression represents a targeted myofascial release and mechanotransduction. Applying steady, directional thumb pressure over the *Urvi* and *Ani Marma s* deforms the extracellular matrix of the underlying deep connective tissues and skeletal muscle fibers. This physical force deforms localized fibroblasts, downregulating pro-inflammatory cytokines, reducing the activity of matrix metalloproteinases, and stimulating the synthesis of extracellular matrix components. Furthermore, compression helps break down chronic pericapillary fibrin cuffs and capsular adhesions, restoring tissue compliance and joint flexibility.[xv]

6.2. Neurovascular Modulation and Hydrodynamics

Stimulating the *Urvi Marma* within the adductor canal directly targets the saphenous nerve and the femoral vessels. Because the saphenous nerve provides sensory innervation to the medial aspect of the knee joint, manual stimulation modulates nociceptive transmission. It triggers the release of endogenous opioids and induces a localized, segment-specific analgesic effect, reducing *Sandhishoola*. Concurrently, compressing the femoral artery and vein within the adductor canal creates a transient, localized ischemic pressor response. Upon releasing the pressure, a hyperemic surge occurs, optimizing popliteal and genicular arterial blood flow. This surge improves microvascular perfusion to the avascular articular cartilage and periarticular soft tissues, promoting tissue regeneration and restoring synovial fluid hydrodynamics.

Stimulating the *Ani Marma* targets the quadriceps tendon and the articularis genu muscle, which pulls the suprapatellar bursa superiorly during knee extension. This manual stretching reduces patellofemoral friction, increases the range of motion, and prevents the development of *Stabdhata* (stiffness).[xvi,xvii]

6.3. Thermal Synergy and Transdermal Delivery

The subsequent application of heated *Patra Pinda Sveda* provides deep thermal energy that acts synergistically with *Vimlapana* . Heat-induced vasodilation lowers blood viscosity, relieves local muscle spasms (especially in the quadriceps and popliteus muscles), and improves the range of motion. The combined application of *Tila Taila* (rich in sesamin, sesamolin, and essential fatty acids) and heat facilitates the transdermal absorption of anti-inflammatory phyto-constituents. This process enhances joint lubrication, reduces crepitus (*Vatapurnadritisparsha*), and prevents further wear and tear.

6.4. Clinical Context and Literature Comparison

Conventional non-pharmacological management of knee osteoarthritis typically relies on physical therapy, weight management, and oral analgesics. However, long-term NSAID use is associated with gastrointestinal, renal, and cardiovascular toxicities. In contrast, *Marma* -targeted physical therapies (such as *Vimlapana* and *Svedana*) offer a safe, highly effective, non-pharmacological alternative. Clinical trials evaluating similar manual and thermal therapies (e.g., *Janu* Basti or traditional knee mobilization) consistently report marked improvements in WOMAC scores, pain thresholds, and joint range of motion, validating the results observed in this patient.

7. Strengths and Limitations-

The major strength of this case report is the integration of systematic cadaveric dissection with clinical outcomes, establishing a clear structural and neurovascular mechanism for *Marma* therapy. The clinical protocol was executed without any adverse events or the need for rescue analgesics, demonstrating an excellent safety profile. However, certain limitations must be acknowledged. The clinical evaluation was

restricted to a relatively short follow-up period of 45 days, and lacked advanced objective imaging (such as post-treatment MRI or ultrasound) to quantitatively evaluate cartilage regeneration or changes in synovial volume.

Future research should utilize larger randomized controlled trials with long-term follow-up and advanced diagnostic tools. This approach could integrate *Marma* -based *manipulation* into sports medicine and orthopedic rehabilitation, offering a non-pharmacological strategy to accelerate recovery from ligamentous injuries, prevent muscle wasting, and manage degenerative joint diseases.

8. Conclusions

This case report demonstrates that the combined application of *Vimlapana* and *Patra Pinda Sveda* over *Janu*, *Ani*, and *Urvi Marma s* is highly effective in managing the pain, stiffness, swelling, and tenderness associated with knee *Sandhivata* . Mapping these vital points through cadaveric dissection reveals that *Marma* therapy is not merely a traditional ritual, but a targeted physical intervention that modulates the underlying femoral-popliteal neurovascular bundle, the quadriceps tendon, and the articular capsule of the knee. This integration of classical therapeutics with modern cross-sectional anatomy provides a validated, reproducible, non-pharmacological pathway for clinical orthopedics and degenerative joint rehabilitation.

9. Patient Perspective

The patient shared her anonymous perspective on her clinical course:

"Before starting this therapy, my knee pain made my daily teaching duties almost impossible, and the medications I took for pain left me with constant stomach burning. Within the first two weeks of this traditional hand pressure and heat treatment, the deep, constant ache began to lift, and the stiffness in the mornings became manageable. By the end of the treatment, the swelling had completely disappeared, and I could walk, stand, and climb stairs without pain or support. I have regained my active lifestyle without relying on stomach-irritating painkillers."

10. Ethical Declarations

Informed Consent

Written informed consent was obtained from the patient for the clinical interventions, diagnostic procedures, and the publication of this de-identified case report, including laboratory parameters and radiological findings.

11. Conflict of Interest

All authors attest that they meet the current ICMJE criteria for authorship. The authors declare that they have no competing interests.

12. CRediT authorship contribution statement

- Dr Amit Gehlot: Conceptualization, Supervision,,Investigation, Data curation, writing – original draft,writing – review & editing.
- Dr Hemant Rajpurohit -Writing – review & editing, Writing – original draft.
- Dr. Ravi Sharma & Dr.Praveen kumar:- Supervision, Conceptualization writing ,review & editing.

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