3. Pragandasthi Bhagna (Humerus Fracture), Bahiprakoshthasthi Bhagna (Radius Fracture), Antaprakoshthasthi Bhagna (Ulna Fracture)

Fractures of the Arm and Forearm: An Integration of Shalya Tantra and Modern Orthopedics

This section provides in-depth knowledge on the fractures of the upper limb, specifically focusing on **Pragandasthi Bhagna** (Humerus Fracture), **Bahiprakoshthasthi Bhagna** (Radius Fracture), and **Antaprakoshthasthi Bhagna** (Ulna Fracture). For each fracture, we will explore the clinical features, diagnostic modalities, potential complications, and management protocols, drawing parallels and integrating the wisdom of Ayurvedic Shalya Tantra with contemporary orthopedic practices.

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1. Pragandasthi Bhagna (Humerus Fracture)

The **Pragandasthi** (humerus) is the long bone of the upper arm, extending from the shoulder to the elbow. Fractures of the humerus are classified based on their location: proximal (near the shoulder), shaft (mid-portion), and distal (near the elbow). Each type has distinct features and management considerations.

a) Proximal Humerus Fracture (Surgical Neck/Greater Tuberosity)

These are common in elderly individuals, often resulting from a fall on an outstretched hand.

- **Clinical Features (Lakshanas):**
  - **Ayurvedic Perspective:** The patient presents with **Teevra Vedana** (severe pain) in the shoulder region, **Shotha** (swelling), and significant **Kriya Hani** (loss of function), being unable to lift the arm. **Sparsha Asahishnutva** (tenderness) over the shoulder is marked. A visible **Vikriti** (deformity) and **Sparshajanya Shabda** (crepitus) may be present. The arm is typically held close to the chest, supported by the other hand.
  - **Modern Perspective:** The clinical picture includes intense pain, swelling, and extensive ecchymosis (bruising) that may travel down the arm and onto the chest wall. The patient exhibits a severely restricted range of motion of the shoulder. It is crucial to perform a neurovascular examination to rule out injury to the **axillary nerve** (checked by assessing sensation over the deltoid region and deltoid muscle contraction) and the brachial plexus.
- **Diagnosis (Nidana):**
  - **Ayurvedic Approach:** Diagnosis relies on the **Trividha Pariksha** – **Darshana** (inspection for swelling and deformity), **Sparshana** (palpation for tenderness and crepitus), and **Prashna** (history of trauma).
  - **Modern Approach:** A definitive diagnosis is made with **radiographs (X-rays)** of the shoulder, including anteroposterior (AP), lateral (scapular-Y), and axillary views. A **CT scan** may be necessary for complex fractures with significant displacement or articular involvement to aid in surgical planning.
- **Complications (Upadrava):**
  - **Immediate: Axillary nerve injury** is the most common complication. Injury to the brachial artery is rare but serious.
  - **Late: Adhesive capsulitis (frozen shoulder)** is very common due to prolonged immobilization. **Malunion** (healing in an improper position), **non-union** (failure to heal), and **avascular necrosis (AVN)** of the humeral head (death of bone tissue due to lack of blood supply) are significant long-term complications.
- **Management (Chikitsa):**
  - **Ayurvedic Management:**
    - **Kushal Karma (Initial Management):** For minimally displaced fractures, immobilization is key. This is achieved using a **Kavala Bandha** (sling and swathe) to support the arm. **Sheeta Lepa** (cold compresses) with herbs like **Chandana** (Sandalwood) can be applied to reduce **Shotha**.
    - **Sandhana Karma (Promoting Healing):** Internal administration of **Asthisandhanakara Dravyas** (bone-healing herbs) like **Laksha Guggulu**, **Abha Guggulu**, and milk medicated with

Arjuna bark is advised. A nutrient-rich diet is emphasized.
    - **Punarvasana (Rehabilitation):** Gentle pendulum exercises are initiated early to prevent stiffness, followed by gradual mobilization as healing progresses.
  - **Modern Management:**
    - **Conservative:** The majority of proximal humerus fractures are minimally displaced and can be treated non-surgically with a **sling** for 2-3 weeks, followed by early, gentle physical therapy to restore range of motion.
    - **Surgical:** Surgery is indicated for significantly displaced fractures, fractures involving the articular surface, or in active, younger patients. Options include **Open Reduction and Internal Fixation (ORIF)** with plates and screws, or **Shoulder Arthroplasty** (hemiarthroplasty or reverse total shoulder replacement) for severe, comminuted fractures in the elderly.

b) Humeral Shaft Fracture

These often result from a direct blow to the arm or a fall.

- **Clinical Features (Lakshanas):**
  - **Ayurvedic Perspective:** Presents with the cardinal signs of **Bhagna** – **Vedana**, **Shotha**, **Vikriti** (visible angulation or shortening of the arm), **Sparshajanya Shabda**, and complete **Kriya Hani**.
  - **Modern Perspective:** The patient has gross swelling, deformity, and abnormal mobility of the upper arm. A critical part of the examination is to check for **radial nerve injury**, which is common with this fracture. This is assessed by asking the patient to extend their wrist and fingers (“wrist drop” is a classic sign of radial nerve palsy).
- **Diagnosis (Nidana):**
  - **Ayurvedic Approach:** Based on clinical examination (**Trividha Pariksha**).
  - **Modern Approach: X-rays** of the entire humerus (AP and lateral views), including the shoulder and elbow joints, are essential to confirm the fracture and assess its pattern.
- **Complications (Upadrava):**
  - **Immediate: Radial nerve palsy** is the most frequent complication. Vascular injury to the brachial artery can also occur.
  - **Late: Non-union** is more common in humeral shaft fractures than in other locations. **Malunion** and joint stiffness of the shoulder and elbow can also be issues.
- **Management (Chikitsa):**
  - **Ayurvedic Management:** The principles of **Bhagna Chikitsa** are applied. **Anchana** (traction) and **Peedana** (manipulation) may be required for reduction, followed by **Sthirikaran** (immobilization) using splints made from bamboo or the bark of trees like **Arjuna**, secured with **Bandhana** (bandages). Internal medications like **Gandha Tailam** are used to promote healing.
  - **Modern Management:**
    - **Conservative:** Most humeral shaft fractures are managed non-surgically with a **coaptation splint** initially, followed by a **functional brace**. This allows for micromotion at the fracture site, which stimulates healing while controlling alignment.
    - **Surgical:** Surgery is indicated for open fractures, fractures with vascular injury, failed conservative treatment (non-union), or in polytrauma patients. Common surgical options include **ORIF** with plates and screws or an **intramedullary nail** inserted down the center of the bone.

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2. Bahiprakoshthasthi Bhagna (Radius Fracture)

The **Bahiprakoshthasthi** (radius) is one of the two bones of the forearm, located on the thumb side. Fractures can occur at the head (near the elbow), shaft, or distal end (near the wrist).

a) Radial Head and Neck Fracture

Typically caused by a fall on an outstretched hand.

- **Clinical Features (Lakshanas):**

- Pain is localized to the lateral aspect of the elbow.
- **Shotha** (swelling) within the elbow joint (hemarthrosis).
- **Kriya Hani** is marked by a significant inability to rotate the forearm (supination and pronation).
- Tenderness is elicited on palpating the radial head.

- **Diagnosis (Nidana): X-rays** of the elbow are the primary diagnostic tool. Sometimes, the fracture can be subtle, and the only sign on an X-ray might be the "fat pad sign," indicating fluid (blood) in the joint. A **CT scan** can provide more detail for complex fractures.
- **Complications (Upadrava):** The main complication is **stiffness of the elbow**, particularly loss of rotation. Post-traumatic arthritis can develop if the joint surface is damaged.
- **Management (Chikitsa):**
  - **Ayurvedic Management:** For undisplaced fractures, **Sthirikaran** with a splint and **Lepa** for swelling is advised. Early gentle movements are encouraged to prevent stiffness.
  - **Modern Management:** Minimally displaced fractures are treated with a sling for a short period, followed by early mobilization. Displaced fractures may require **ORIF** with small screws or a plate. In severely comminuted fractures, **excision of the radial head** or **radial head replacement (arthroplasty)** may be necessary.

b) Distal Radius Fracture (Colles' and Smith's Fracture)

This is one of the most common fractures in adults, especially in post-menopausal women with osteoporosis.

- **Colles' Fracture:** Caused by a fall on an outstretched hand with the wrist in extension. The distal fragment is displaced **dorsally (upwards)**.
- **Smith's Fracture (Reverse Colles'):** Caused by a fall on the back of a flexed wrist. The distal fragment is displaced **volarly (downwards)**.

- **Clinical Features (Lakshanas):**
  - **Ayurvedic Perspective:** The patient reports a history of a fall followed by immediate **Teevra Vedana**, **Shotha**, and **Vikriti** at the wrist. In a Colles' fracture, this deformity is classically described as a "dinner fork" or "bayonet" deformity. There is complete **Kriya Hani** of the wrist and fingers.
  - **Modern Perspective:** The clinical signs are pain, swelling, and a visible deformity of the wrist. A thorough neurovascular exam is crucial to check for **median nerve compression**, a common complication, especially in Smith's fractures.
- **Diagnosis (Nidana): X-rays** of the wrist (AP and lateral views) are sufficient for diagnosis and to assess the degree of displacement, angulation, and articular involvement.
- **Complications (Upadrava):**
  - **Immediate: Median nerve injury** (acute carpal tunnel syndrome).
  - **Late: Malunion** is very common, leading to deformity, pain, and reduced grip strength. **Stiffness** of the wrist and fingers, **post-traumatic arthritis**, and **Complex Regional Pain Syndrome (CRPS)** are other significant complications.
- **Management (Chikitsa):**
  - **Ayurvedic Management:**
    - **Kushal Karma:** After assessing the fracture, reduction is performed by **Anchana** and **Peedana**.
    - **Bandhana:** Immobilization is done using bamboo splints and bandages, often soaked in medicated oils like **Murivenna**. The wrist is kept in a position opposite to the deformity (palmar flexion for Colles').
    - **Sandhana Karma:** Internal medicines like **Abha Guggulu** and external applications (**Lepa**) of herbal pastes (**Manjishthadi Lepa**) are used.
  - **Modern Management:**
    - **Conservative:** For undisplaced or minimally displaced fractures, a **cast** is applied after closed reduction. The cast extends from below the elbow to the knuckles and is worn for about 6 weeks.
    - **Surgical:** Surgery is indicated for unstable fractures, significantly displaced intra-articular fractures, or failed conservative treatment. Options include **Closed Reduction and Percutaneous Pinning (CRPP)** with K-wires, **external fixation**, or **ORIF** with a volar plate and screws.

3. Antaprakoshthasthi Bhagna (Ulna Fracture)

The **Antaprakoshthasthi** (ulna) is the forearm bone on the side of the little finger. It can be fractured in isolation or, more commonly, along with the radius.

a) Olecranon Fracture

This is a fracture of the bony point of the elbow. It's usually caused by a direct fall onto the elbow or a powerful contraction of the triceps muscle.

- **Clinical Features (Lakshanas):** The patient has pain, swelling, and bruising over the back of the elbow. A key finding is the **inability to actively extend (straighten) the elbow** against gravity. A palpable gap may be felt at the fracture site.
- **Diagnosis (Nidana):** A **lateral X-ray** of the elbow is the best view to diagnose and assess the displacement of an olecranon fracture.
- **Complications (Upadrava): Stiffness**, **non-union**, and **ulnar nerve symptoms** are potential complications. The hardware used for fixation can sometimes be prominent and require removal.
- **Management (Chikitsa):**
    - **Ayurvedic Management:** Undisplaced fractures can be managed with an above-elbow splint in slight flexion. **Lepa** and internal medicines for healing are used.
    - **Modern Management:** Since these are intra-articular fractures and the triceps muscle pulls the fragment apart, most olecranon fractures require surgery. The most common procedure is **ORIF using the tension band wiring technique** or a plate and screws.

b) Ulnar Shaft Fracture (Nightstick Fracture)

This is an isolated fracture of the ulnar shaft, typically resulting from a direct blow to the forearm while raising it in self-defense.

- **Clinical Features (Lakshanas):** The patient presents with localized pain, swelling, and tenderness over the ulnar border of the forearm.
- **Diagnosis (Nidana): X-rays** of the forearm are required.
- **Complications (Upadrava): Non-union** can occur, especially in displaced fractures.
- **Management (Chikitsa):**
    - **Ayurvedic Management:** Immobilization with splints and bandages, along with standard **Bhagna Chikitsa**.
    - **Modern Management:** Minimally displaced fractures can be treated conservatively with a **functional brace or cast**. Displaced fractures (more than 50% displacement or >10 degrees of angulation) often require **ORIF** with a plate and screws.

Note on Both-Bone Forearm Fractures: Fractures of both the radius and ulna shafts are common and are usually treated surgically in adults with **ORIF** for both bones to restore the precise anatomy required for forearm rotation. In children, these are often managed with closed reduction and casting.