# Consideration of safety during Sangyaharan practice for surgeries on Asthi -Roga patients

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**Abstract:**

Many surgical conditions of Bhagna (fractures and dislocations) are mentioned in Sushrut Samhita[1.] A very good description and concept is wisely contributed to the entire world first time[2.] He mentioned that it was caused by trauma of different origin. [3]

Acharya Sushruta divided Bhagna into two types[4] -Sandhimukta (Dislocations) and Kand Bhagna (Bone Fractures). It refers to fractures and dislocations caused by trauma. It`s detailed description is mentioned in Nidanasthana Chapter 15 and Chikitsasthana Chapter 3. It was mentioned first time, the fundamental principles of traction, manipulation, alignment, and immobilization for the management of *Kandabhagna* (bone fractures) and *Sandhimoksha* (joint dislocations) which are used in orthopaedics practices still today.

**Kandabhagna (Bone Fractures):** Divided into 12 types based on the shape and pattern of the break, such as *Kati* (transverse), *Vakra* (oblique), *Challita* (fissured) and *Splutita* (splintered).

**Sandhimoksha (Dislocations):** was divided into 6 types of joint displacements[5] depending on the direction and nature of the dislodgement.

The basic Treatment Principles of Bhagna Chikitsa[6] is mentioned as

**Anchhana (Traction),** Pulling the limb to stretch and align overlapping or shortened bone fragments.

**Pidana (Manipulation):** Applying localized manual pressure to depress raised fragments or elevate depressed ones.

**Sankshepa (Apposition):** Bringing separated or displaced ends into precise contact.

**Bandhana (Immobilization):** Securing the reduced fracture using splints (*Kushabandha*) and medicated pastes (*Lepa*).

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He further mentioned surgical approach[7] also. Keeping in view the present scenario of management in Ayurvedic surgery, Sangyaharan (anaesthesia) plays a great role to make the procedure painless. Therefore in this article it is mentioned about the different safety issues and plan of Sangyaharan to be fallowed for the management of surgical procedure for Asthi Bhagna.

**KeyWords:** Sandhimukta, *Kandabhagna*, Anchhana, Pidana, poikilothermic.

Many orthopedic surgical procedures are performed under regional anesthesia.

**Anesthesia for orthopedic surgery requires[8]:**

- well known to the special positioning requirements (risk of peripheral nerve injury),
- to the possibility of large intraoperative blood loss and techniques to limit the impact of this occurrence (intraoperative hypotension, salvage techniques).
- the risk of venous thromboembolism (emphasizing the need for the anesthesiologist to consider the interaction of anticoagulants and antiplatelet drugs with anesthetic drugs or techniques, especially regional anesthesia).
- a brief neurologic examination with documentation of any pre-existing deficits is recommended.

**Pre-Existing Medical Problems:**

- Coronary artery disease (perioperative β blockade should be considered)
- Rheumatoid arthritis (steroid therapy, airway management)

**Physical Examination:**

- Mouth opening or neck extension
- Evidence of infection and anatomic abnormalities at proposed sites for introduction of regional anesthesia.

Peripheral techniques may be acceptable if a regional technique is contraindicated.

-Arthritic changes and limitations to positioning.

***Choice of Anesthetic Technique:***

Advantages of Regional anesthesia technique versus General Anesthesia for Orthopedic Surgical Procedures:

1. Postoperative adequate analgesia.

2. Decreased incidence of nausea and vomiting.
3. Less respiratory and cardiac depression.
4. Improved perfusion because of sympathetic nervous system block.
5. Decreased intraoperative blood loss.
6. Decreased blood pressure.
7. Blood flow redistribution to large caliber vessels.
8. Locally decreased venous pressure.

Note: Spinal cord injuries must be considered in any patient who has experienced trauma. Cervical spine injuries are associated with head and thoracic injuries and lumbar spine injuries are associated with abdominal injuries and long bone fractures.

**Consideration of Tracheal Intubation[9]:**

- Airway management is critical because the most common cause of death with acute cervical spinal cord injury is respiratory failure.
- All patients with severe trauma or head injuries should be assumed to have an unstable cervical fracture until proven otherwise radiographically.
- Awake fiberoptic-assisted intubation may be necessary, with general anesthesia induced only after voluntary upper and lower extremity movement is confirmed.

In a truly emergent situation, oral intubation of the trachea with direct laryngoscopy (minimal flexion or extension of the neck) is the usual approach.

***Respiratory considerations:***

Respiratory considerations include an inability to cough and clear secretions, which may result in atelectasis and infection.

***Cardiovascular considerations:***

Cardiovascular considerations are based on loss of sympathetic nervous system innervation ("spinal shock") below the level of spinal cord transection. (Cardioaccelerator fiber [T1–T4] loss results in bradycardia and possible absence of compensatory tachycardia if blood loss occurs.)

***Succinylcholine-Induced Hyperkalemia[10]:***

Succinylcholine-Induced Hyperkalemia It is usually safe to administer

succinylcholine (Sch) within the first 48 hours after spinal cord injury. It should be avoided after 48 hours in all patients with spinal cord injuries.

***Temperature Control:***

Loss of vasoconstriction below the level of spinal cord transection causes patients to become poikilothermic. (Body temperature should be maintained by increasing ambient air temperature and warming intravenous [IV] fluids and inhaled gases).

***Maintaining Spinal Cord Integrity:***

An important component of anesthetic management is preservation of spinal cord blood flow. (Perfusion pressure should be maintained, and extreme hyperventilation of the lungs should be avoided.) Neurophysiologic monitoring (somatosensory or motor evoked potentials), a "wake-up test," or both are used to recognize neurologic ischemia before it becomes irreversible.

***Autonomic Hyperreflexia:***

1. Occurs in 85% of patients with spinal cord transection above T5
2. Paroxysmal hypertension with bradycardia (baroreceptor reflex)
3. Cardiac dysrhythmias
4. Cutaneous vasoconstriction below and vasodilation above the level of transection
5. Precipitated by any noxious stimulus (distention of a hollow viscus)

Treatment is removal of stimulus, deepening of anesthesia, and administration of a vasodilator.

***Pulmonary Considerations:***

Postoperative ventilation of the patient's lungs is likely to be necessary if the vital capacity is below 40% of the predicted value. Prolonged arterial hypoxemia, hypercapnia, and pulmonary vascular constriction may result in right ventricular hypertrophy and irreversible pulmonary hypertension.

**Cardiovascular Considerations:**

Prolonged alveolar hypoxia caused by hypoventilation and ventilation/ perfusion mismatch eventually causes irreversible vasoconstriction and pulmonary hypertension.

## Surgical Approach and Positioning:

The prone position is used for the posterior approach to the spine. (The hazards of the prone position, including brachial plexus stretch injury [the head should be rotated toward the abducted arm and the eyes taped closed], should be considered.

The anterior approach is achieved with the patient in the lateral position, usually with the convexity of the curve uppermost. Removal of a rib may be necessary. A double-lumen endotracheal tube is used to collapse the lung on the operative side.

A combined anterior and posterior approach in one or two stages yields higher union rates but is associated with increased morbidity, including blood loss and nutritional deficits.

### *Anesthetic Management:*

Respiratory reserve is assessed by exercise tolerance, vital capacity measurement, and arterial blood gas analysis. Autologous blood donation is often recommended (usually ≥4 U can be collected in the month before surgery).

There are specific anesthetic considerations for surgical correction of scoliosis by spinal fusion and instrumentation.

### *Anesthetic Considerations for Surgical Correction of Scoliosis:*

1. Management of the prone position
2. Hypothermia (long procedure and extensive exposed area)
3. Extensive blood and fluid losses
4. Maintenance of spinal cord integrity
5. Prevention and treatment of venous air embolism

Reduction of blood loss through hypotensive anesthetic techniques.

Adequate hemodynamic monitoring and venous access are essential in the management of patients undergoing spinal fusion and instrumentation.

### *Monitoring for Patients Undergoing Scoliosis Surgery[11]:*

1. Cannulation of radial artery (direct blood pressure measurement and assessment of blood gases)
2. Central venous catheter (evaluates blood and fluid management and aspirate air if

venous air embolism occurs)

3. Pulmonary artery catheter (pulmonary hypertension)

Neurophysiologic monitoring (prompt diagnosis of neurologic changes and early intervention) Somatosensory evoked potentials Motor evoked potentials Wake-up test.

Spinal stenosis, spondylosis, and spondylolisthesis are forms of degenerative vertebral column disease that may lead to neurologic deficits necessitating surgical intervention.

***Surgical Approach and Positioning:***

Cervical laminectomy is most often performed with patients in the prone position . Prone position with the patient's head turned and the dependent ear and eye protected from pressure. Chest rolls are in place, the arms are extended forward without hyperextension, and the knees are flexed.

Fiberoptic-assisted intubation may be necessary in patients with severely limited cervical movement.

The anterior approach places the surgical incision (anterior border of the sternocleidomastoid muscle) near critical structures (carotid artery, esophagus, trachea [edema and recurrent nerve injury are possible]).

The use of the sitting position for cervical laminectomy allows a more blood-free surgical field but introduces the risk of venous air embolism. The incidence is less than for sitting posterior fossa craniotomy, but the patient still needs to be monitored with precordial Doppler.

**Anesthetic Management:**

General anesthesia is most often selected for spinal surgery because it ensures airway access and is acceptable for prolonged operations. Patients undergoing cervical laminectomy should be assessed preoperatively for cervical range of motion and the presence of neurologic symptoms during flexion, extension, and rotation of the head. (Awake fiberoptic intubation of the trachea may be necessary.)

Sch should be avoided if there is evidence of a progressive neurologic deficit.

*Spinal Cord Monitoring: Paraplegia is a feared complication of major spine surgery. The incidence of neurologic injuries associated with scoliosis correction is 1.2%. When patients awaken with paraplegia, neurologic recovery is unlikely, although immediate*

*removal of instrumentation improves the prognosis.*

It is therefore essential that any intraoperative compromise of spinal cord function be detected as early as possible and reversed immediately. The two methods for detecting intraoperative compromise of spinal cord function are the "wake-up test" and neurophysiologic monitoring.

***wake-up:***

The wake-up test consists of intraoperative awakening of patients after completion of spinal instrumentation. Surgical anesthesia (often including opioids) and neuromuscular blockers are allowed to dissipate, and the patient is asked to move the hands and feet before anesthesia is re-established. Recall may occur but is rarely viewed as unpleasant, especially if the patient is fully informed before surgery.

***Neurophysiologic monitoring[12]:***

- Neurophysiologic monitoring (as an adjunct or an alternative to the wake-up test) includes :
- Somatosensory evoked potentials (SSEPs) (waveforms may be altered by volatile anesthetics, hypotension, hypothermia, hypercarbia),
- Motor evoked potentials (MEPs) (neuromuscular blocking drugs cannot be used), Electromyography.

SSEPs reflect the dorsal columns of the spinal cord (proprioception and vibration) supplied by the posterior spinal artery.

- MEPs reflect the motor pathways and the portion of the spinal cord supplied by the anterior spinal artery.

The combined use of SSEPs and MEPs may increase the early detection of intraoperative spinal cord ischemia.

If both SSEPs and MEPs are to be monitored during major spine surgery, one might consider providing anesthesia with an ultrashort-acting opioid infusion with a low dose of inhaled anesthetic and monitoring the electroencephalogram to minimize the potential for intraoperative awareness.

***Blood Loss[13]:***

- A combination of IV hypotensive agents and volatile anesthetics is frequently used in an attempt to decrease blood loss during surgery.

Perioperative coagulopathy from dilution of coagulation factors, platelets, or fibrinolysis may be predicted from measurement of either the prothrombin time or activated partial thromboplastin time.

***Visual Loss After Spine Surgery[14]:***

Most cases are associated with complex instrumented fusions often associated with prolonged intraoperative hypotension, anemia, large intraoperative blood loss, and prolonged surgery.

The American Society of Anesthesiologists' Closed Claims Registry concludes that patients at high risk for postoperative visual loss after major spine surgery are those in whom blood loss is 1000 mL or greater or undergoing surgery lasting 6 hours or longer.

***Venous Air Embolus[15]:***

Venous air embolism can occur in all positions used for laminectomies because the operative site is above the heart level. Presenting signs are usually unexplained hypotension and an increase in the end-tidal nitrogen concentration.

***Postoperative Care:***

1. Most patients' tracheas can be extubated immediately after posterior spinal fusion operations if the procedure was relatively uneventful and preoperative vital capacity values were acceptable. The presence of severe facial edema may prevent prompt tracheal extubation.
2. Aggressive postoperative pulmonary care, including incentive spirometry, is necessary to avoid atelectasis and pneumonia.

**Continued hemorrhage in the postoperative period is a concern.**

**Epidural and Spinal Anesthesia After Major Spine Surgery:**

Postoperative anatomic changes make needle or catheter placement more difficult after major spine surgery.

Changes After Major Spine Surgery That May Influence the Ability to Perform Epidural or Spinal Anesthesia:

1. Degenerative changes (spondylothesis below level of fusion) that increase the chance of spinal cord ischemia and neurologic complications with regional anesthesia

2. Ligamentum flavum injury from prior surgery results in adhesions and possible obliteration of the epidural space or interference with spread of local anesthetic solution ("patchy block")
3. 3.Increased incidence of accidental dural puncture if the epidural space is altered by prior surgery (blood patch is difficult to perform if needed)
4. Prior bone grafting or fusion may prevent midline insertion of the needle.

**Spinal anesthesia may be a more reliable technique than epidural anesthesia if a regional technique is selected.**

The presence of postoperative spinal stenosis or other degenerative changes in the spine or pre-existing neurologic symptoms may preclude the use of regional anesthesia in these patients.

**Reference:**

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2. Sushrut Samhita Nidan sthan chap.-15/2-, pg. 291
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4. Sushrut Samhita Nidan sthan chap.-15/4, pg. 291
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