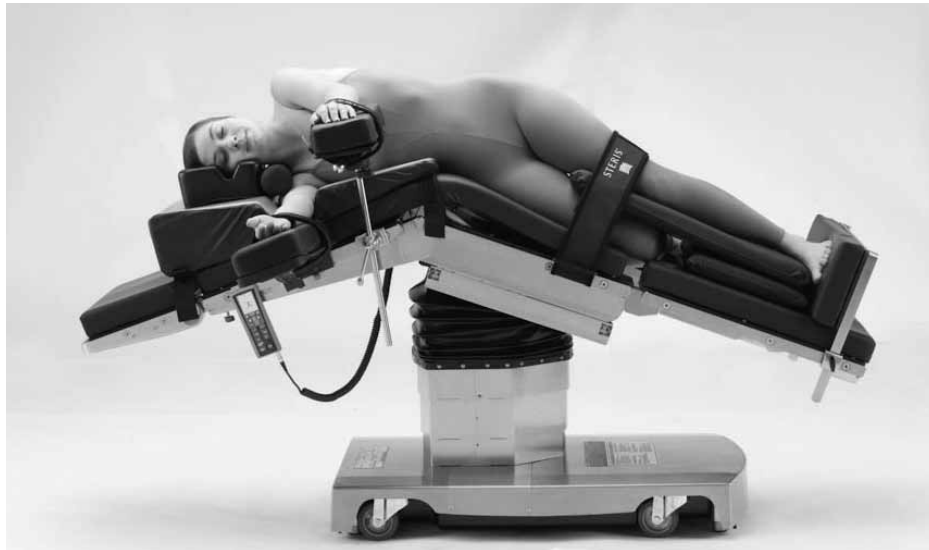


# Interoperative Patient Positioning: It's More Than Just Comfort



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# Interoperative Patient Positioning: It's More Than Just Comfort - Study Guide #02

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## Description of Study Guide Topic

Proper patient positioning maintains appropriate anatomical alignment, prevents skin breakdown and nerve or tissue injury and provides patient comfort. Even the most simple positions and procedures can harm the patient if details, such as alignment or pressure management, are not considered. Improper patient positioning can have disastrous and maybe even permanent effects on patients; therefore, every surgical team member must become an expert in proper patient positioning.

## Overall Purpose of the Study Guide

To describe the important elements of pressure management and injury prevention when positioning a patient for surgery.

## Objectives

Upon completion of this study guide program, the participant should be able to:

1. Review the importance of proper positioning during a surgical procedure to prevent patient injuries.
2. Identify what nursing considerations have to be addressed to prevent positioning injuries.

## Intended Audience

This study guide is a self-study program intended for use by perioperative nurses, surgical technologists, endoscopy suite nurses, infection prevention nurses and other healthcare professionals interested in this topic.

## Introduction

Perioperative nurses face challenges in patient positioning every day. The most significant difficulty confronting nurses is safely and efficiently positioning all sizes and shapes of patients into many different postures while preserving skin integrity and preventing injury. The nurse must thoroughly comprehend a variety of surgical positions and the nursing considerations and protective measures needed to prevent patient injury. When positioning a patient, pressure management must be provided and specific factors must be considered such as:

- > What is the patient's overall condition?
- > How long will the procedure last?
- > What techniques will be used during the operative procedure (i.e., x-rays)?
- > How much exposure of the operative site is needed?
- > What will be the expected anatomic and physiologic changes associated with anesthesia?

Positioning involves moving, stabilizing and securing the patient's body to allow for the most optimal exposure of the surgical site while maintaining physiological functions and patient comfort. Some of the goals of proper patient positioning and pressure management include:<sup>1</sup>

- > Optimal exposure and access to the surgical site
- > Maintenance of proper anatomical body alignment
- > Support of circulatory and respiratory functions
- > Protection of neuromuscular and skin integrity

- > Access to IV sites and anesthesia support services
- > Prevention of patient injury
- > Enhancement of patient comfort

The perioperative nurse, surgeon and anesthesia provider are the professionals most responsible and accountable for proper patient positioning. Positioning should not compromise the integumentary system, musculoskeletal system, cardiovascular system, respiratory system, or nervous system. Therefore, the nurse must not only understand the functioning of these systems, but must be able to quickly assess the patient's condition to establish a baseline of information to assist with positioning. For example, if the nurse assesses that the patient is a severe diabetic with tissue breakdown on the left heel, appropriate measures must be taken to ensure further injury doesn't result from improper pressure management and patient positioning.

## Patient Assessment

Nursing assessment begins with the preoperative interview as required by the Centers for Medicare & Medicaid Services (CMS). During this interview the circulating nurse should review the chart for the height, weight and overall medical condition of the patient. Assessment of the skin integrity and range of motion should be made at this time. Any deficiencies should be noted on the chart.

Clinically, the pre-operative assessment is critical in identifying conditions present before surgery so an accurate post-operative assessment can be made. Some risk factors or patient conditions that lead to an increased vulnerability for patient injury from improper positioning are:

- > Long procedures (three hours or longer)
- > Vascular surgery (where optimal blood flow may already be compromised due to a disease process)
- > Bone and joint conditions (i.e., osteoporosis, malignant metastasis to the bone, arthritis)
- > Sustained pressure to certain areas (pregnancy)
- > Geriatric patients (are more prone to skin breakdown due to their aging and often compromised circulatory system and their thinning skin layers)
- > Pediatric patients (are often more prone to pressure injuries resulting from the use of adult-sized positioning aids. If pediatric surgery is to be performed, then appropriate pediatric devices must be available for proper and safe positioning)
- > Malnutrition
- > Anemia
- > Obesity
- > Diabetes
- > Hypovolemia
- > Paralysis
- > Extreme thinness

Nursing assessment includes a logical and sequential evaluation using objective and subjective information about the patient's condition. Proper positioning of the patient requires an assessment of the following systems: integumentary, musculoskeletal, cardiovascular, respiratory and nervous systems.

## Integumentary System

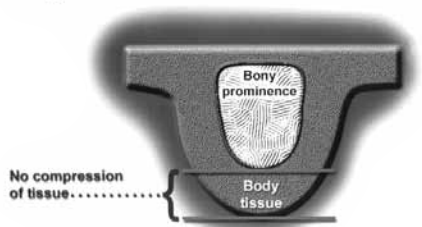
The skin is the first line of defense against pathogenic invasion; therefore, any break in the integrity of or injury to the skin can lead

to further complications. If the skin over bony prominences is thin, then prolonged pressure and contact can easily cause breakdown of the tissue. Whenever skin is compressed or pulled (skin shear) for lengthy periods of time, blood vessels may constrict or occlude, leading to decreased blood flow and ischemia. This can be the first step in the process of ulcer formation.

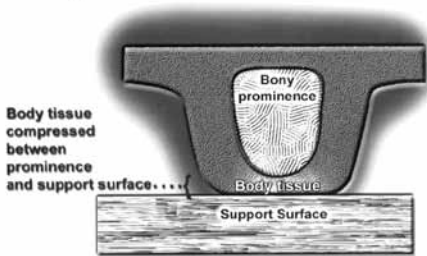
During patient positioning or during the maintenance of a position, there are four external physical factors that can injure the skin if they occur: pressure, shear, friction and maceration.

**Pressure** is defined as the product of force applied over a given area. When pressures are over 32mm Hg, arterioles can be occluded, thus decreasing the nourishment and oxygenation of the tissue at the capillary level.<sup>2</sup> If this pressure is sustained, tissue ischemia and microscopic necrosis will occur due to decreased tissue perfusion. Occlusion and necrosis can occur much quicker in patients at high risk as compared to other patients. But even patients without predisposing factors or high-risk conditions can easily be injured because of the prolonged pressure exerted over certain skin surfaces while the patient is under anesthesia.

**Bony Prominence without Pressure**



**Bony Prominence with Pressure**



When patients are immobile, the chance of pressure ulcer formation multiplies. Patients undergoing lengthy surgical procedures are at higher risk for ulceration since:<sup>5</sup>

- > They may be positioned in a manner that causes increased pressure on specific body parts and areas
- > They are immobile and unable to change position during the procedure
- > They are subjected to prolonged anesthesia, which leads to the absence of sensory perception

In FY 2007, CMS reported 257,412 cases of preventable pressure ulcers as secondary diagnoses. The average cost per case in which pressure ulcers were listed as a secondary diagnosis is estimated to be \$43,180 per hospital stay<sup>2,3</sup>. Approximately 1.5 million hospitalized patients in the US will develop pressure ulcers with about 30% to 40% of these ulcerations starting in the surgical suite. Research shows that 8.5% of all patients having surgical procedures that last longer than three hours develop pressure ulcers.<sup>6</sup>

Some of the risk factors that contribute to the formation of pressure ulcers during surgery include:

- > Poor circulation, low blood pressure and other vascular problems
- > Use of thermal blankets to prevent hypothermia (increased heat stimulates the demand for additional oxygenated blood flow to areas where the flow may already be compromised, thus hastening the chance of tissue damage)
- > Pooling of moisture from perspiration, blood, prep solutions, or irrigation solutions that may weaken the skin and increase the risk of pressure ulcer formation
- > Immobility of the patient throughout the surgery from anesthesia or heavy sedation

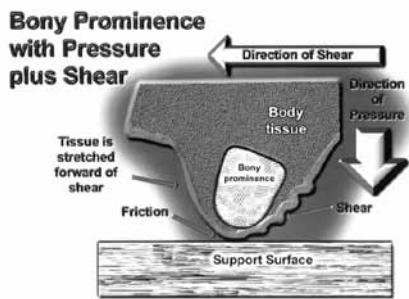
Pressure ulcers are graded by the stages of severity and observed tissue damage. These stages are described below:

- Stage 1: A non-blanchable erythema occurs, causing the skin to appear red. The color does not return to normal. For dark-skinned persons, warmth, discoloration, edema, induration, or hardness may also be indicative of this stage.
- Stage 2: Damage is superficial with the skin being blistered, cracked, or peeling. There is a partial thickness skin loss involving the epidermis, dermis, or both. The ulcer will present as an abrasion, shallow crater, or blister.
- Stage 3: The skin becomes broken with the full thickness of the skin involved. The subcutaneous tissue may also be affected and the involvement may even extend to the underlying fascia. These ulcers will appear as deep craters with or without serous or blood drainage.
- Stage 4: The full thickness of the skin and the subcutaneous tissue are destroyed. A deep crater-like ulceration will form. There usually is destruction, damage, or tissue necrosis to the muscle, bone, or supporting structures such as tendons, fascia, or joint capsules. Pressure can come from two sources - internal (patient's own body weight) or external (eg, devices). Surgical team members can even inadvertently lean on the patient for extended periods of time causing pressure problems.

The duration of pressure is more important than the intensity of the pressure. The body can usually withstand great pressure for short time periods as compared to less pressure for longer periods of time. Injury from prolonged pressure may not even be evident for hours or even days. Because the pressure ulcer or injury starts at the bony prominence and extends to the skin (from the inside out), deeper necrosis and damage take many hours or even days to present to manifest themselves at the skin level. Because of this delay in the appearance of an injury at the skin level, an erupting pressure ulcer may not be associated with the surgical experience.

Repositioning a patient helps to decrease prolonged pressure on an area. Since repositioning is not practical during a lengthy surgical procedure, the nurse must plan ahead and ensure that conforming mattresses and, if necessary, positioning devices are used.

**Shearing** occurs when the underlying body tissue (i.e., skeletal structure) moves while the skin remains stationary. During shearing, the resulting stretching and tearing of the underlying tissues can cause vascular occlusion, which can lead to tissue ischemia. When moving a patient, the patient should be slightly lifted to allow the skin to realign with the surrounding underlying structures. An ideal mattress or pad surface will move with a patient.



**Friction** occurs when two surfaces rub against each other. An example of positioning friction would occur when a patient is dragged across the bed linen instead of being lifted. Friction can also be caused by face masks or safety straps. When friction occurs, the skin is denuded and abraded. Inflammation or infection can result as well as pain. The extent of the friction can result in superficial or deeper skin and tissue injury.

**Maceration** occurs when prolonged fluid on the skin saturates and weakens the epidermis making it more vulnerable to the effects of pressure, shearing, or friction. During surgery, maceration can occur from pooling prep solutions, profuse patient sweating, urine or fecal incontinence, or the pooling of blood or irrigation solutions. If this excessive moisture is located in an area where high pressure exists, the epidermal layer of the skin is more apt to denude and start a pressure ulceration. Every effort must be made to prevent fluid pooling and maceration.

The most logical method to prevent pressure, shearing, friction, or maceration problems is to focus on appropriate pressure management by using a clinically proven surgical table pressure management mattress. An effective pressure management mattress or pad is one that:<sup>5</sup>

- > Will allow for patient immersion. A full pressure management mattress will disperse the body weight over a larger area without resistance as compared to an overlay or smaller pressure pad
- > Will not bottom out. Bottoming out occurs when a bony prominence has pushed down so far into the pressure mattress or pad that the body part is resting on a hard surface. Bottoming out can occur if the mattress or pad is too thin, malfunctions, or changes thickness when the patient's position is altered
- > Will relieve the shear forces caused by patient movement. The ideal mattress or pad surface will move with the patient by absorbing the shear forces into the support surface

The surgical team members must determine if a pressure management system meets the above criteria for effectiveness. Armed with the knowledge of what causes pressure ulcerations and other positioning injuries, they can then evaluate the potential of a pressure management system to best meet the needs of surgical patients in preventing pressure injuries.

## Musculoskeletal System

The musculoskeletal system is the structural framework that supports the body and makes movement possible. Unusual pressure or overextended joint positioning can easily cause patient injury to the musculoskeletal system. Since anesthesia agents cause the relaxation of muscles, muscle and joint problems can result from extreme positioning, stretching and twisting of the ligaments, tendons and muscles. When pressure is prolonged, the blood supply to the underlying tissue may be compromised and necrosis may occur.

The perioperative nurse and other surgical team members need to be keenly aware of skeletal anatomy so that proper positioning can be accomplished using positioning devices. These same positioning devices can also cause damage to nerves, blood vessels and underlying support tissue if placed inappropriately or padded inadequately.

## Cardiovascular System

During general anesthesia, peripheral blood vessels dilate. This may lead to the pooling of blood in extra cellular tissue, thus decreasing the circulating blood volume. Proper positioning and minor position changes during a procedure can help to treat this problem. Patients with existing hypovolemia or cardiovascular disease can further aggravate a vascular system that may be compromised due to poor positioning techniques.

Repositioning during a procedure needs to be closely monitored by the anesthesia provider to prevent untoward effects resulting in hypotension. The blood vessels that are most susceptible to changes in position are the inferior vena cava, deep and superficial vessels of the lower extremities, subclavian and axillary arteries and the external iliac artery. Decreased cardiac output and enhanced venous pooling can result when position changes and patient responses are not monitored continually.

Compression from a tight safety strap or restraints will eventually lead to vascular occlusion and possible venous thrombosis. Hyperabduction of the arm beyond 90 degrees can compress vessels causing possible thrombosis formation. When an arm is extended, a radial pulse should be monitored to ensure that vessels are not being obstructed.

## Respiratory System

Improper positioning can affect the patient's ability to ventilate. Positioning devices can even restrict the movement of the chest wall if not used properly. If lungs are not permitted to expand adequately, then alveoli may begin to close causing a decreased gas exchange in the lung. Pulmonary complications can result, especially in patients with preexisting respiratory disease.

Obese patients, pregnant women and patients with respiratory insufficiency may have difficulty breathing if placed in the supine position. Elevating the head of the surgery table usually helps to alleviate this problem. During surgery, the patient's respiratory status should be monitored with a pulse oximeter to readily note any respiratory problems that may be developing.

## Nervous System

Peripheral nerves are more susceptible to injury from improper positioning than central nerves are. Pressure on superficial nerves during a surgical procedure can cause temporary or permanent damage that results in impaired sensory or motor function. Often nerve injury is not discovered until the patient is in the PACU or even days or weeks after the incident has occurred. This may lead to the question of whether the injury occurred during the surgical procedure or during recovery or convalescence.

The nerves that are injured most often are the:

- > Ulnar nerve - passes from the upper arm to the lower arm. Compression close to the elbow can cause clawing of some of the fingers
- > Brachial plexus - network of nerves extending from the clavicle down the upper arm. Overextension of the arm can cause numbness and palsies affecting the arm, wrist and hand
- > Lower extremity nerves - located in the legs. These nerves can be damaged from positioning device compression or improper stirrup use
- > Lumbosacral nerve roots - located in the lower back area. Lengthy surgeries with the patient in lithotomy position can stretch nerves causing sensory deficit in the anterior thigh and weakness of the quadriceps muscle

## Positioning Aids

Various positioning aids are available to secure and pad the body and body parts without causing injury. They need to be inspected regularly to make sure they will serve their intended purposes. The most common positioning pads are described below.

- > **Arm boards** - Padded armrests should be placed at less than a 90 degree angle to the midline of the body and level to the floor to prevent nerve injury. Restraint straps must not have sharp or abrasive edges and they should always secure the arm to the board, but must not be too tight
- > **Foot board** - The foot board supports the feet in various positions and is primarily used to prevent plantar flexion or foot drop
- > **Head rests** - Padded and fitted head rests provide access to the patient's airway and offer protection for the head, eyes and face
- > **Lateral support** - Lateral support (or kidney rest) is used to limit patient movement laterally
- > **Multi-task arm boards** - Multi-task arm boards are used when unique positioning of the arm is required. These arm boards provide a wide range of adjustments to support the arm when the patient is in the supine, lateral, prone, or sitting position
- > **Padded rolls** - Padded rolls are used to pad the chest during prone positioning and between knees and axillary regions during lateral positions
- > **Split leg positioner** - Split leg positioners provide surgeon and c-arm access to lower extremities and perineum without compromising vascular and/or nervous system integrity
- > **Stirrups** - Stirrups are used to position the legs for the lithotomy position. Stirrups should be well-padded to prevent injuries to the saphenous vessels and nerves on the medial (inside) aspect of the knee. Stirrups should be placed on the table at the same height and at an outward angle, preventing contact between the leg and the stirrup holder. When

removing legs from stirrups, both legs should be removed slowly and at the same time to prevent joint and nerve injury

## Operating Tables

Operating tables are designed to meet the need for anatomical accessibility and provide a safe and effective means for positioning the surgical patient. Perioperative nurses have the responsibility for being knowledgeable about the operation of the surgical table and accessories. Often surgical suites have a variety of operating table models and brands, so each table must be studied to understand its capabilities. Standardization of surgical tables and accessories is a very effective way to control expenditures.

A general operating table can be adjusted for height and length, can be tilted laterally to either side, tilted horizontally (head up or head down) and in some cases slid to head or foot to increase Imaging Amplification (IA) capability. The table is usually divided into four sections (head, back, seat, leg) that support the major body parts. The head section is often removable with a variety of attachable head rests available.

The table surface and arm boards should be covered with table pads that are designed for pressure management, ease of cleaning and patient comfort. Battery and electric tables usually

have a hand control that regulates all of the tables functions. Perioperative nurses should be very familiar with this control as they are often called upon to assist with table positioning and patient movement.

With multiple positioning capabilities, the general operating table has become so versatile that very few specialty tables are needed in today's surgical environment. A general operating table that is adaptable to a wide range of surgical procedures and x-ray capabilities permits different procedures to be scheduled using the same table throughout the day. Previously, specialty tables had to be moved in and out of surgical rooms to accommodate specific surgical positioning needs.

## Nursing Considerations for Surgical Positions

The most common surgical positions are supine, Trendelenburg, reverse Trendelenburg, prone, lithotomy, sitting and lateral positions.

The perioperative nurse needs to understand the basics of these positions, how to provide pressure management and how to prevent positioning injuries. These positions are discussed in the following sections.

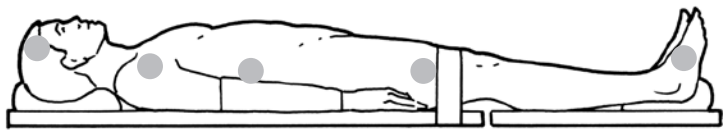
Consideration of head positioning is of special note in several of these positions. Extended local pressure on the scalp can lead to localized postoperative alopecia. Symptoms usually develop within a few days to a week after surgery. Sometimes scalp pain, swelling, or exudate may be present before the actual loss of hair occurs. Research has shown that repositioning the head every 30 minutes helps to reduce the likelihood of this problem.<sup>6</sup>

When head and neck surgery is performed, a ring-shaped head rest or small pillow is often utilized for head immobilization and to support cervical alignment, reduce the strain on neck muscles and reduce occipital pressure.<sup>7</sup> A soft pillow will distribute the weight of the head more evenly as compared to a doughnut-shaped head rest with a hole in the center.

## Supine Position

Supine (dorsal recumbent) is the most common surgical position as it is the natural position of the body at rest. This position is used for any anterior approach procedure and most extremity and thoracic procedures.

In the supine position, the patient's back and spinal column are resting on the table mattress, which may be a pressure management pad (a pad specifically designed and constructed to minimize pressure problems). The arms rest easily at the side of the body with the palms facing the body or with the palms down and fingers extended on the mattress. When the arm is resting on an arm board, the arm must be positioned at less than a 90 degree angle from the body with palms up to limit the pressure on the radial and ulnar nerves. The restraint strap should be placed about two inches above the knee.



Supine Position

Compression of the popliteal area should be avoided as venous thrombosis could result. The position of the head should place the cervical, thoracic and lumbar vertebrae in a straight line.

Back aches and pressure-point reactions are the two main complications associated with the supine position. Potential pressure areas in the supine position are the occiput, scapula, olecranon, sacrum, coccyx and calcaneus (indicated with dots in the illustration below). If an effective surgical table pressure management mattress is not used, these areas should be positioned using a pressure reducing device, such as those made from gel, foam, air, or fluid. Compromised patients (diabetic,

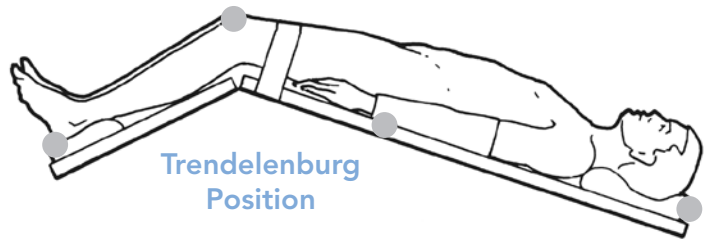
obese, hypotensive, underweight and those having a procedure lasting more than two hours) should have either protective padding specifically placed under the elbows, sacrum, heels and occiput or be positioned on a clinically proven surgical table pressure management pad. The circulatory system is affected from the supine position as a result of the horizontal body position and the changed effects of gravity. The respiratory system is also affected, since vital capacity of the lungs will be less than in the erect position. The supine position does allow for a more even distribution of ventilation from apex to the lung bases.

## Trendelenburg

A German urologist named Trendelenburg first introduced this position. It is a variation of the supine position, with the upper torso being lowered and the feet raised. This very common position allows optimal visualization of the pelvic organs during laparoscopy and lower abdominal procedures. It is also used to improve circulation to the cranium during sudden drops in blood pressure. Any variant of this position should be maintained only as long as necessary.

The respiratory system is affected when a patient is in the Trendelenburg position due to the weight of the abdominal contents on the diaphragm. The patient should be returned to the supine position slowly to allow the body to adjust to the physiologic changes from this movement.

The method of restraining a patient from sliding off of the table is also a consideration. Some shoulder post-style restraint devices can put a large amount of pressure on the subclavian vessels and brachial plexus and may cause injury.

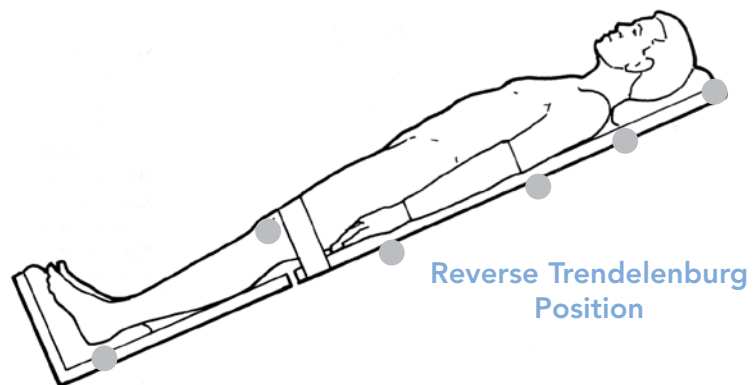


Trendelenburg Position

## Reverse Trendelenburg

Reverse Trendelenburg is known as the head up and feet down position. This is used frequently to provide access for head and neck procedures. In this position, the patient must be supported with a padded foot board, body restraint (to prevent flexion or buckling of the knees) and a lift sheet that stabilizes the arms (from above the elbow to the fingers). Reverse Trendelenburg is often used during procedures such as laparoscopic cholecystectomy, head and neck surgeries and laparoscopic Nissen fundoplication as it aids in visualization and decreases blood supply to those areas.

Respiratory function is less affected in this position but, venous circulation can be compromised when the legs are in the downward placement for an extended time. Application of support hose, elastic stockings, or automatic compression devices can be used to help assist with venous return. Sequential compression stockings are usually applied for prophylaxis against deep vein thrombosis. Return to the supine position after reverse Trendelenburg should be done slowly to avoid an overload to the cardiovascular system.



Reverse Trendelenburg Position

## Prone Position

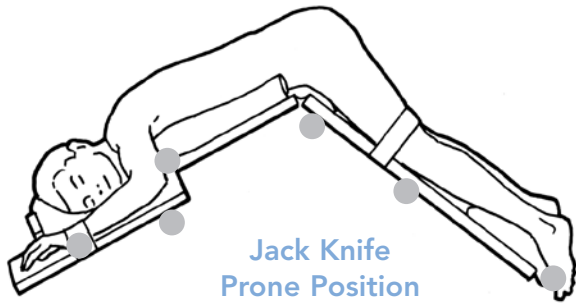
In the prone position the patient is lying with the abdomen on the operating table mattress. This position and variations of this position provide surgical access to the cervical spine, back, rectal area and lower extremities. The patient is usually anesthetized in the supine position on a stretcher then rolled onto the operating table. The patient should be turned using at least four people while the anesthesia provider maintains the airway and stabilizes the head. The turning movement should be slow, gentle and uniform by all four team members. Hypotension is a common problem that can occur when an anesthetized patient is rapidly turned. Careful checking of the fingers is mandatory so that correct anatomical positioning can be ensured after placing the patient in the prone position.

The respiratory system is the most vulnerable to complications during the prone position. When lying prone, chest movement is limited, thus decreasing vital capacity and tidal volume. Padded chest rolls (extending bilaterally from the shoulders to the iliac crest) or a special prone positioning frame will allow for chest movement so that the respiratory system is not compromised or restricted. Extra pressure pads should be applied to the chest, knees and ankles as the pressure exerted in the prone position is usually greatest on these

areas. A small pillow should be placed under the patient's feet to prevent pressure from developing over the foot dorsum and to facilitate venous return by slightly elevating the lower extremities.



Prone Position



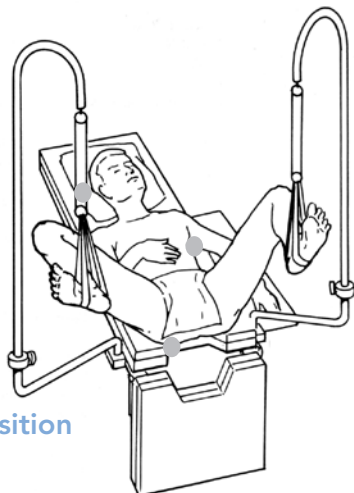
Jack Knife Prone Position

### Lithotomy Position

Lithotomy is the most extreme of the supine positions. When the patient is supine, the buttocks are brought to the lower break in the table and the legs are raised and abducted to give surgical access to the perineal and rectal area. Procedures on the prostate, vagina, groin and rectum are performed in the lithotomy position. This is the second most common surgical position.

When positioning the patient into lithotomy, two team members are needed to lift and position the legs slowly and simultaneously to avoid causing back strain and hip dislocation in the patient. Proper placement of the legs in the stirrups is also critical. The stirrups should be of equal height and attached to the OR table at the same level.

If additional exposure is needed, flexion or internal rotation should be done at the hip and not at the knee. Patient positioning must be checked to maintain hip-knee-foot alignment so as to avoid over abduction of the knee. Extreme care should be taken with patients who have hip prosthetics. Newer, booted stirrup systems have been designed that incorporate hydraulic power to assist with proper stirrup positioning thus minimizing the potential for patient or healthcare worker injury. These booted stirrups help ensure correct anatomical alignment, which is very difficult to achieve with the



Lithotomy Position

candy-cane style stirrups shown in the illustration below.

When the patient is finally positioned, the bottom of the operating table is lowered for access to the surgical site. When the table end is lowered and then raised again, the patient's fingers must not be near the table break as injury could easily occur. Positioning the patient in lithotomy has a great risk for causing patient injury if not performed appropriately. Respiratory function of the patient in lithotomy is impaired due to the extreme flexion of the thighs creating an increase in intra abdominal pressure against the diaphragm, which decreases the tidal volume. Venous pooling can occur in the splanchnic region during the operative procedure from the gravity flow of blood from the elevated legs. Circulation is enhanced by using support hose while the legs are in stirrups or leg holders. Pressure management pads should be used to line the leg holders to prevent pressure sores and nerve damage to the perineal, popliteal and calcaneus areas.

### Sitting Position

The sitting (Fowler's) position is another variation of the supine position. This position is usually used for neurosurgery, some facial operations, breast reconstruction and some shoulder surgeries.

To place the patient in this position, the patient is first supine on the operating table. The position of the body in relation to the breaks in the operating table is carefully adjusted to prevent abnormal pressure points. The head of the table is slowly raised to 90 degrees while the legs are lowered and the knees are slightly flexed. The feet are placed against a padded foot board to prevent foot drop. The arms are rested on a pillow on the lap with the elbows flexed at 90 degrees or supported to the patient's side on padded arm boards or on a multi-task arm board. Once the positioning is complete, the cervical, thoracic and lumbar sections of the spine should be aligned. The more erect the patient, the greater the need to support the torso and shoulders. There are several head rests available to stabilize the head.

The sitting position causes most of the patient's weight to be on the dorsum of the body. Extra pressure management pads should be placed under the buttocks and small of the back. Excessive pressure in these areas could damage the sciatic nerve. Padding also needs to be under the elbows, knees and heels.

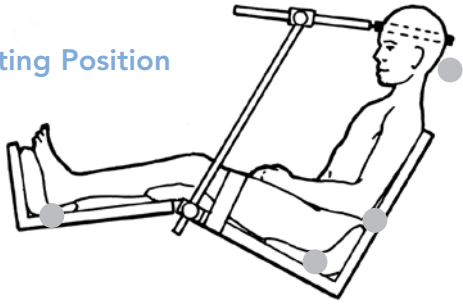
Respiratory function in this position is usually not affected but hypotension is a great risk due to the venous pooling in the torso and lower extremities. Antiembolic stockings or elastic bandages along with sequential compression devices are typically used to help limit venous pooling by supporting venous return.

In the sitting position, a very dangerous complication can occur when the operative site is located above the heart (i.e., neurosurgery). An air embolism can form, caused by the negative venous pressure between the operative site and the right atrium.

Prophylactically, a Doppler ultrasound probe is placed over the chest wall and a central venous catheter is inserted into the pulmonary artery or right atrium to assist with the early diagnosis and treatment of an air embolism. If an air embolism is diagnosed, the exposed area should be sealed or packed with saline soaked sponges or irrigated to prevent further aspiration of air. The anesthesia provider can aspirate the air from the right atrium through the central venous line.

When the procedure is finished, the patient should be moved back slowly to the supine position while allowing the patient's internal systems to make hemodynamic adjustments. The patient should be monitored closely during this repositioning.

## Sitting Position



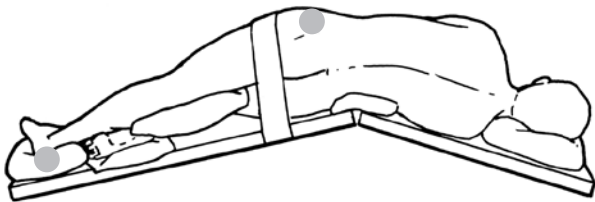
## Lateral Position

The lateral position (also called Sims' position, "park bench" position, lateral decubitus, or lateral recumbent) places the patient on the nonoperative side so surgery can be performed on the hip, chest, or kidney. The right or left lateral positions depends on the side that the patient will be lying on. For example, if the patient is to be in the right lateral position, then the right side is down and the left side (operative side) is up.

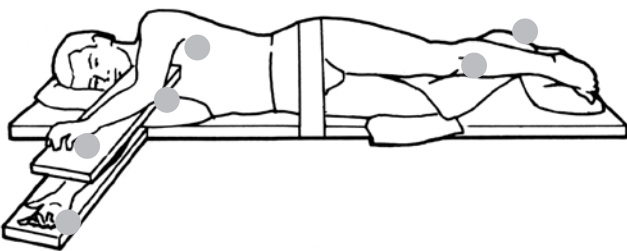
The patient is first placed in the supine position, anesthetized and then slowly and carefully moved to the lateral position. Positioning devices must be readily available before repositioning occurs. A pillow is placed under the patient's head to provide appropriate alignment with the spine. The knee and hip of the bottom leg are flexed to stabilize the patient in this position. The top leg is straight or slightly flexed with a pillow put lengthwise between the legs. Extra padding is placed on the inside aspect of the bottom knee to prevent pressure on the peroneal nerve. The feet and ankles are protected against foot drop and pressure with padding of pillows. The torso is then supported with pillows, rolls, sandbags, or surgical positioning systems. The shoulders, hips and legs are usually secured with an adjustable restraint strap fastened to the operative table.

The upper arm is placed on a multi-task arm board that is padded or on a pillow in front of the patient. The lower arm is flexed and placed on a padded arm board. Radial pulses should be monitored throughout the procedure to ensure adequate circulation. A pulse oximeter, usually placed on the lower hand, may also be used to check the perfusion.<sup>8</sup>

The greatest problem with the lateral position is pressure and nerve damage; therefore, special care is taken to provide appropriate padding. Respirations may also be compromised due to the pressure on the lateral chest wall. To aid in chest expansion, a padded roll can be placed under the lower axilla.



## Lateral Position



## Summary

Proper patient positioning focusing on pressure management requires not only a knowledge of anatomy and physiology but also familiarity with appropriate positioning devices and solid teamwork. Every member of the surgical team must continually assess the patient throughout the procedure to ensure that pressure management is a focal point of patient care. Positioning must be carefully planned and executed to minimize risks and maintain optimal patient safety.

In review, the following interventions should be addressed when positioning a patient:<sup>9</sup>

- > Check with the surgeon and anesthesia provider to determine the position that the patient will be in during the surgical procedure
- > Review the patient's chart and assess the patient's condition before attempting to position a patient
- > Gather the appropriate positioning devices to ensure that padding is intact before using
- > Use high quality pressure management mattresses and aids
- > Request positioning help if needed before the patient is moved
- > Pad bony prominences to prevent pressure and skin breakdown
- > Protect superficial nerves from pressure or straining
- > Secure and support extremities so they won't fall off the bed or be in contact with any hard surface. Make sure legs are uncrossed to prevent circulatory problems or pressure on nerves
- > Ensure that no equipment or devices are resting on the patient
- > Attempt to properly align all body parts when positioning
- > Do not overextend a body part
- > Maintain the patient's dignity and privacy during positioning by preventing unnecessary exposure
- > Use the team approach when moving a patient
- > When positioning a patient, use slow, smooth movements
- > Always use good body mechanics when moving a patient

For reference when developing policies and procedures for positioning a patient, the "Recommended practices for positioning the patient in the perioperative practice setting," that was developed by AORN can be used. The main recommendations are listed below:<sup>12</sup>

Recommended Practice 1: Perioperative assessment for positioning needs should be made before transferring the patient to the procedure bed.

Recommended Practice 2: Positioning devices should be readily available, clean and in proper working order before placing the patient on the procedure bed.

- Recommended Practice 3: The Perioperative nurse should actively participate in monitoring patient body alignment and tissue integrity based on sound physiologic principles.
- Recommended Practice 4: After positioning, the perioperative nurse should evaluate the patient's body alignment and tissue integrity.
- Recommended Practice 5: Documentation of surgical positioning should be consistent with AORN's "Recommended practices for documentation of perioperative nursing care."
- Recommended Practice 6: Policies and procedures related to positioning should be developed, reviewed annually, revised as necessary and available within the practice setting.

# Glossary

## Abduction

To move away from the median plane of the body.

## Adduction

To move toward the median plane of the body.

## Bony prominence

Any elevation, projection, or protrusion of a bone.

## Ischemia

A decreased supply of oxygenated blood to a body part that may be due to constriction or actual obstruction of a blood vessel.

## Lateral position

The position assumed by the patient lying on the unaffected side with the bottom knee and thigh drawn up.

## Lithotomy position

The position assumed by the patient lying supine with the hips and knees flexed and the thighs abducted and rotated externally.

## Necrosis

Localized tissue death or changes indicative of cell death, usually due to lack of blood supply, disease, or injury.

## Prone position

The position the patient assumes when lying horizontally with the face down.

## Reverse Trendelenburg

The position the patient assumes on an inclined plane in which the head and upper torso are elevated above the legs and feet.

## Sitting position

The position the patient assumes when in a reclining position, primarily used for neurosurgical procedures.

## Supine position

The position the patient assumes by lying horizontally on the back.

## Trendelenburg

The position the patient assumes on an inclined plane in which the body and legs are elevated above the head.

## References

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12. "Recommended practices for positioning the patient in the peri-operative practice setting," *Standards, Recommended Practices, and Guidelines*, 2004, Denver, AORN, p. 341-346.

## Suggested Readings

Martin, JT, Warner, MA, Positioning in Anesthesia and Surgery. Third edition, 1997.

## Review Questions

- The best surgical position for access to the abdomen is:
  - supine
  - prone
  - lateral
  - lithotomy
- The brachial plexus extends from the \_\_\_\_\_ down through the upper arm.
  - sternum
  - humerus
  - scapula
  - clavicle
- \_\_\_\_\_ occurs when the underlying body tissue (i.e., skeletal structure) moves while the skin remains stationary.
  - Maceration
  - Friction
  - Pressure
  - Shearing
- A bony prominence is described as:
  - the distal end of long bone
  - any bone protruding through the skin
  - the protrusion or projection of a bone
  - none of the above
- Chest rolls are used for the prone position to:
  - decrease pressure on the lateral sides
  - reduce restriction on the chest and abdomen
  - A & B
  - none of the above
- Foot boards are mostly used to prevent \_\_\_\_\_.
  - pressure on the ankles
  - nerve problems
  - sciatic pain
  - foot drop
- In the sitting position most of the weight rests on the \_\_\_\_\_.
  - spine
  - buttocks
  - dorsum of the body
  - upper thighs
- To avoid a brachial plexus injury you should never:
  - abduct the arm greater than 90 degrees
  - adduct the arm greater than 90 degrees
  - abduct the arm less than 90 degrees
  - place the palms down
- The best description of a stage 3 pressure ulcer is:
  - The skin is red causing a nonblanchable erythema to occur.
  - The skin becomes broken with the full thickness of the skin and possibly the subcutaneous tissue involved.
  - Damage is superficial with the skin being blistered, cracked, or peeling.
  - The full thickness of the skin and the subcutaneous tissue are destroyed.
- An appropriate pressure management mattress will:
  - allow for patient immersion
  - not bottom out
  - relieve shear forces from patient movement
  - All of the above

Answers to Review Questions & Section Sources:  
1. A (Supine Position)  
2. D (Patient Assessment)  
3. D (Patient Assessment)  
4. C (Glossary)  
5. B (Prone Position)  
6. D (Positioning Aids)  
7. C (Sitting Position)  
8. A (Patient Assessment) &  
(Positioning Aids) & (Supine Position)  
9. B (Patient Assessment)  
10. D (Patient Assessment)

## Evaluation Form

### Study Guide #2: Interoperative Patient Positioning: It's More Than Just Comfort

\_\_\_\_\_  
Last Name

\_\_\_\_\_  
First Name/M.I.

\_\_\_\_\_  
RN/LPN/LVN License Number (Circle one: RN - LPN - LVN)

\_\_\_\_\_  
Non-RN: License or Social Security Number

\_\_\_\_\_  
Health Care Facility

\_\_\_\_\_  
Health Care Facility Street Address                      City                      State                      ZIP Code

\_\_\_\_\_  
Current Home Street Address                      City                      State                      ZIP Code

\_\_\_\_\_  
For International Address:                      Country                      Province/Postal Code

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To what extent did the study guide meet the 2 stated objectives below?

- |  |   |                            |                            |                            |                            |
|--|---|----------------------------|----------------------------|----------------------------|----------------------------|
| 1. Review the formation of pressure ulcers, the stages of ulceration and patients at high risk.                          | <input type="checkbox"/> 1                    | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| 2. Identify nursing considerations in surgical positioning that will prevent patient injuries.                           | <input type="checkbox"/> 1                    | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| 3. To what extent is this learning method easy-to-use?   | <input type="checkbox"/> 1                    | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| 4. How much time was required to read the content, take the test, compare your answers and complete the evaluation form? | _____ hours _____ minutes                     |                            |                            |                            |                            |
| 5. Has the provider disclosed the conflict of interest or lack thereof declared by the planners and content specialist?  | Yes _____ No _____ (Review inside cover page) |                            |                            |                            |                            |
| 6. Was the content presented without bias of any commercial product or drug?   | Yes _____ No _____                            |                            |                            |                            |                            |

I have completed all the requirements for this entire activity (please sign and date).

\_\_\_\_\_  
Your signature is required to attest that you have completed the requirements for this activity.

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