LAPAROSCOPIC MINIMALLY INVASIVE SURGERY

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Since the 70's, laparoscopic surgery, has eliminated the need for a large incision, but subsequently it has taken on a whole new terminology. It is now part of the realm of what is referred to as, "Minimally Invasive Surgery", or as Dr. Birch so eloquently worded it at the ORNAA 2009 Red Deer Conference, "The Foreveroscopy".

It's a familiar term; after an extensive set up of instrumentation, anesthetic preparation and administration, patient positioning, prepping and draping, the lights dim. Whether we are in the scrub or circulator role, there are times that we watch the monitor screen and wish we could change the channel, but instead are required to be polite and withstand, "The Foreveroscopy". What staff may sometimes find mundane, patients are required to endure these, sometimes lengthy, procedures. These procedures can sometimes lend themselves to problems, especially after an extended period of time.

This minimally invasive surgery does come with its own set of problems, whether it is a minor or major laparoscopic procedure. It is essential to maintain our role as patient advocate, being aware of safety concerns for the laparoscopic patient, whether performed under local, spinal or general anesthesia.

Injury to the brachial plexus, ulnar nerve, common peroneal nerve, femoral nerve, lower back, hips or knees can be complications of improper positioning during laparoscopic surgery resulting from compression and stretching.

Brachial plexus injury is avoided by positioning both arms with gel pads placed near the ulna, beneath the elbow, with palms towards the body and fingers straight, tucked securely by the side. Positioning the arms at the patient's side avoids damage to the brachial plexus from hyperextension of the arms and padding underneath the elbows with a gel pad prevents pressure against the ulnar nerve. The patient gown should be removed to prevent bunching in the axilla, which can cause pressure on the brachial plexus. The use of protective arm supports may be necessary to prevent the surgeon and assistants from leaning against the shoulders or arms causing

further pressure on the nerves from external sources. If arms are not tucked at the patient's side, then they should be secured on padded arm boards, not extending greater than 90 degrees, to prevent over-stretching of the brachial plexus.

Padding of the hands is extremely important in lithotomy positioning to prevent crushing injury or amputation of the fingers when the bed is leveled from the lithotomy to normal bed position. The fingers can become engaged in the hinge mechanism as the lower section is raised. The diligence of staff is paramount to protect exposed phalanges, and the leg section is never raised without direct visualization of the fingers.

Padding pressure points and bony prominences from IV tubing, blood pressure tubing, ECG lead wire, pulse oximeter tubing and urinary catheter tubing is a consideration as well. After an extended period of time, these become ideal targets for pressure point injuries. Cautery pads should be well placed, especially with the use of sequential compression stockings and support stockings.

Some literature indicates that the use of shoulder braces in steep trendelenberg positioning, can cause brachial plexus injury and should be used with caution. Shoulder braces must be well padded and placed above the supraclavicular joint, not the soft tissue of the neck. They should not be used if arms are extended on arm boards. A gel pad under the patient is an alternative to shoulder bracing. Gel pads prevent shearing or slippage in the event of extreme trendelenberg or reverse trendelenberg positioning. The gel pad should be placed next to the patient's skin, without the use of bed linens. This provides a non slip barrier between the patient and mattress, as well as pressure reducing properties. The mattress itself should be secured to the OR bed with Velcro, or bed strap to prevent movement.

Hydraulic padded stirrups (as opposed to the candy cane stirrups) provide a safe positioning for patients in lithotomy, allowing one to raise and lower, abduct and adduct operatively without the need of releasing and readjusting the side rail socket during surgery. With the use of the candy cane stirrups there is a risk of external rotation of the hips and hyperabduction, exaggerated rotation and flexion, not to mention neuropathies of the foot.

With lithotomy positioning, the patient's legs are positioned in padded stirrups, with special attention paid to the common peroneal nerve and the

femoral nerve. Attention should be given to the lateral aspect of the knee since the peroneal nerve runs along the lateral aspect of the fibula. In this case a good cushioned stirrup is necessary. To prevent femoral nerve injury the legs should not be placed in extreme flexion, external rotation and abduction. The femoral nerve can be overstretched and compressed by this positioning. To determine comfort and/or pain levels, patients that have undergone previous total hip or knee replacement, require surgeon directed lithotomy positioning prior to their anesthetic.

Releasing the patient from lithotomy positioning, the legs should be lowered simultaneously, with special attention being given to the joints to prevent strain. The legs should be lowered slowly to allow for gradual blood shift into the lower extremities, preventing the blood pressure from decreasing too quickly.

Lumbosacral strain in lithotomy positioning can be prevented when the patient's buttocks is not allowed to overextend, but remain even with the edge of the OR bed. Again, the use of a gel pad under the patient will prevent slippage of the patient in reverse trendelenberg.

Deep vein thrombosis can be prevented with the use of sequential compression stockings or support stockings. This is especially important in patients that are positioned in reverse trendelenberg.

Supine reverse trendelenberg positioning requires the use of a padded footboard on lower bed segment to support the feet. The footboard supports the patient's body, when the bed is tilted towards the floor.

The eyes and face should be protected, especially from instrumentation that can be inadvertently placed on the patient's face during surgery. The eyelids should be taped shut with the use of eye pads or shields to reduce the risk of corneal abrasion or undo pressure on the eyes from external forces. Anesthetic screens may provide a physical barrier and reminder to the surgical team, to protect the patient's face.

The use of room temperature IV solutions, CO_2 for insufflation and low temperatures in the OR theatre, can cause hypothermia after an extended period of time. Temperature controlled forced-air warming blankets, warmed IV solutions and heated CO_2 can suspend the lowering of the patient's temperature to unacceptable values. All of these preventative

techniques can be implemented to maintain normothermia. Perioperative hypothermia can contribute to impaired wound healing, which in turn can lead to susceptibility of surgical site infection and longer hospital stays.

Since the inception of laparoscopic minimally invasive surgery there has been an evolution in the role of the perioperative nurse. Continuing education is vital, especially with the introduction of new laparoscopic procedures requiring staff to be aware of special considerations for instrumentation, positioning and complications. Minimally invasive surgery has offered a safe approach to a multitude of procedures, which provides for a shorter hospital stay, reduced postoperative pain, and faster recuperation.

As registered nurses, we are integral members of the health care team. We are instrumental in preventing complications arising from patients undergoing minimally invasive procedures. We must be diligent in the application of proper positioning, understanding its principles and implementing this knowledge to provide a safe environment for our patients undergoing surgery.

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