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FAILURE OF SPINAL ANESTHESIA-A REVIEW

Anesthesiology

Dr. Kunda Dimble Krishna Institute of medical Sciences, Karad, Maharashtra, India. - Correspondence
Dr. Soudamini Gandhi Krishna Institute of medical Sciences, Karad, Maharashtra, India
Dr. Naseema Kanase Krishna Institute of medical Sciences, Karad, Maharashtra, India

KEYWORDS:

Introduction:
In the year 1998 Spinal anesthesia celebrated its first centennial and till now it is one of the main method of regional anesthesia. The spinal anesthesia works by producing transient and reversible block of conduction of the impulses through the anterior and posterior spinal nerve roots along with the posterior roots ganglion in the dorsal, lumbar and sacral regions of the body.[1]

Spinal anesthesia, in contrast to many other regional anesthesia methods, has a clear end point indicating correct needle placement to have free flow of cerebrospinal fluid (CSF) from the needle. Although spinal (subarachnoid or intrathecal) anesthesia is the most reliable types of regional block methods, the possibility of complications has long been recognized. Failure of spinal anesthesia is one of the most challenging complications for the patient and the anesthesiologist even when it is immediately apparent, but it may have serious consequences once surgery has started. The management of the failed block will depend on the nature of the inadequacy and the time at which it becomes apparent. Thus, some monitoring of the onset of the block and correct interpretation of the observations are both vital.[2]

The incidence of failure with spinal anesthesia varies in different studies, ranging from 3% to 17%. In some smaller studies, failure rates as high as 30% have been reported. Spinal anesthesia can be classified as a failure if the surgical operation cannot be performed without the addition of general anesthetic or an alternative regional block. There are many difficulties during administration of spinal anesthesia. It is difficult to locate subarachnoid space exactly or the needle may move during the injection of the anesthetic. The spinal puncture may be difficult to perform because of abnormal anatomy, obesity, or poor cooperation or pain experienced by the patient. Good clinical judgment and cooperation with the patient are essential to prevent complications associated with multiple punctures in close proximity to the spinal canal and nerve roots. Unfortunately, most often patients who are at risk for unsuccessful spinal anesthesia tend to be high-risk patients for general anesthesia as well.[3,4,5.]

The most common reason for failure is not obtaining an adequate level of anesthesia for the surgical procedure. The next reason for failure was “complete failure,” meaning that none of the anesthetic reached the CSF. This may be due to needle movement during injection or the needle bevel being located between the dura and arachnoid membrane during injection. A third major cause was that the duration of the surgery exceeded the duration of the anesthetic.[6]

The various Preoperative and intraoperative and Postoperative Mechanisms for failure of Spinal anesthesia are:

Anxiety
It is very stressful for the patient while preparation for spinal anesthesia. Which may result in anxiety. Anxiety causes many physiological changes.[7]

Positioning of the patient
The position of the patient also plays an important role in the failure. The patient should be placed on a firm Surface. Many aspects are considered while locating the exact place. The lumbar laminae and spines must be 'separated' maximally by flexing the whole spine, the hips, and knees; rotation and lateral curvature of the spine are avoided.[8]

Location and dose
Accurate identification of Lumbar inters spaces preferable but angle of needle should be appropriate However, care should be taken not to venture too cephalad and risk damage to the spinal cord. The dose of the anaesthetic chosen will depend on the specific local anaesthetic used, the baricity of that solution, the patient's subsequent posture, the type of block intended, and the anticipated duration of surgery. Although the appearance of CSF in the needle hub is an essential pre-requisite for spinal anaesthesia, but the successful blockade is not guaranteed and therefore requires an effective dose and its actual deposition in the CSF.[9]

Complications (intraoperative and postoperative) of Sa[10]
1. Hypotension
Spinal anaesthesia has an expected complication that is Hypotension. It occurs when the sympathetic chain becomes blocked, especially when higher dermatome levels are needed. A fall in blood pressure may initiate nausea and vomiting, indicating ischaemia on the spinal cord,which in turn induces an undesired condition for the patient.

2. **Hypothermia**
In neuraxial anaesthesia a decrease in body temperature is commonly encountered. Vasodilation due to sympathetic blockade increases skin blood flow, which allows for lowering the body's core temperature. A decrease in core temperature may initiate shivering, especially during the postoperative period, which increases oxygen consumption. Hypothermia is known to induce hyper coagulation and infections. Special care should be exerted to decrease this physiologic stress, especially in paediatric, obstetric and patients in advanced age, since it may lead to serious consequences, including low perfusion to the vital organs, coronary ischaemia and infection.

3. Post-dural-puncture headache
PDPH is a difficult complication, mostly observed in middle-aged women and the obstetric population. Lower body mass index, previous PDPH and the presence of chronic headaches are other risk factors.

4. Transient neurologic symptoms
Radicular symptoms, including pain, a burning sensation on the buttocks, dysaesthesia and paraesthesia may be observed following spinal anaesthesia. These symptoms generally subside within two days. But these clinical features are alarming for possible serious consequences.

5. Urinary retention
Bladder distension during the postoperative period produces discomfort to patients and unless relieved, leads to more severe complications, including permanent injury to the detrusor muscle. Spinal anaesthesia influences urination by blocking all afferent nerve fibres, rendering the patient unable to feel bladder distension or urinary urgency.

6. Haematologic complications
Spinal haematoma following spinal anaesthesia is a severe

complication that requires early surgical intervention to prevent permanent neurological damage. Advanced age, female gender, patients receiving drugs that influence coagulation, difficulty in performing block and placement of the indwelling epidural catheter are mentioned as risk factors. The presence of haematoma is frequently suspected in the case of an unexpected increase in the duration of motor block or delay on recovery. Neurosurgery within eight hours after the epidural haematoma is mandatory to regain motor functions without neurologic harm.

7. Infectious complications

Although bacterial meningitis following neuraxial anaesthesia is an uncommon complication, in cases where it does occur it may result in severe harm, including permanent neurologic disability and death. The presence of a fever and neurologic disturbance may provide a differentiation from PDPH. Epidural abscess is generally caused by skin flora; the bacteria most frequently involved is *S. aureus*. It is therefore prudent to initiate treatment with synthetic penicillin, even in the absence of a positive culture.

8. Neurologic complications

There are many reported incidence of permanent neurological injury following spinal anaesthesia varied between 0 to 4. 2 per 10 000 patients. Pre-existing spinal pathology or disease increases the incidence of postoperative neurologic complications following neuraxial blockade. Repeated attempts or improper positioning of patients may facilitate neurologic injury. Lumbar canal stenosis is another contributing factor for adverse neurologic outcome. The presence of scoliosis with or without prior surgery constitutes difficulties for performing neuraxial anaesthesia. When compared to spinal blocks, the success rate was lower with epidural anaesthesia, due to technical difficulties and improper distribution of local anaesthetics.

9. Neurological diseases

Patients with pre-existing neurological diseases such as multiple sclerosis, amyotrophic lateral sclerosis, or a post-poliomyelitis condition have previously been considered as Complications in Spinal Anaesthesia It is believed that mechanical trauma caused by a needle or catheter, toxicity induced by local anaesthetics or neural ischaemia due to additives could worsen the patient's neurological status. Increased stress may induce inflammation deteriorates the clinical course, that may confuse with neural injury due to the procedure. However, recent evidence has demonstrated that spinal anaesthesia might be an option in this patient group

10. Cardiac arrest and perioperative death

Bradycardia and cardiac arrest are the most worrisome complications related to spinal anaesthesia. The incidence of these conditions has been observed to be higher with spinal block in comparison with general anaesthesia. The influence of cardio-accelerator fibres originating between T1 to T4 plays a crucial role in maintaining blood pressure and heart rate according to the level of anaesthesia induced by spinal block, depleted vascular volume or insufficient replacement with fluids, and the presence of deep sedation is considered a risk factors for bradycardia and cardiac arrest. Surgical intervention may also trigger bradycardia and cardiac arrest by vagal discharge or embolization.

Conclusion:

Many complications occur which results in failure of spinal anasathesia.The complications are mainly due to the various techniques or the drugs used for the procedure.By taking carefull precautions,monitoring the patients,and manging the complication on time and with appropriate method one can overcome with the failure of anesthesia.

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