

Caudal Anesthesia through Drilling Hole on Sacral Hiatus: A Case Report.

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Abstract: A 40 (forty) year old male patient with Ankylosing Spondylitis was admitted for total replacement of left hip joint. Fusion of the axial skeleton, immobility of cervical spines and restricted movement of temporomandibular joint lead to anticipate difficulty in intubation and failure of central neuraxial blockade for total hip replacement. Above factors also compelled to discard the attempts for spinal or epidural or general anesthesia (G.A.) in the conventional way. Last of all, it was decided to operate under caudal anesthesia. But it was difficult to administer caudal anesthesia through calcified sacral hiatus. After thorough discussion with surgeons, decision was taken to drill the calcified membrane over the sacral hiatus. Through the drilling hole, nerve stimulator needle was introduced and 30 ml of local anesthetic was injected in sacral epidural space after electing dorsiflexion moment of great toe. Satisfied anesthesia developed within 5 minutes. At last, an epidural catheter was inserted within sacral epidural space and kept it left in the sacral epidural space. Operation was completed smoothly without any disturbance from patient's side. No hemodynamic instability was noted.

Keywords: axial skeleton, cervical spines, blind nasal intubation, awake fiber optic intubation, peripheral nerve block, psoas compartment, nerve stimulator

I. Introduction

Airway management is the essential and topmost important component of general anesthesia and major responsibility of anesthesiologist during and after operation. For maintaining an intact functional airway and also for ventilating the anaesthetized patient, several techniques are advocated. Among those, endotracheal intubation achieved top most priority in airway management and also in ventilating the patient either for short term or long term procedure. Awake nasal intubation or fiber optic intubation is useful at the time of failed intubation or anticipated difficult intubation or at the time of failure of maintaining airway integrity and restoration of functional airway patency with mask ventilation. Laryngeal mask airway or intubating laryngeal mask airway is also useful to establish an airway patency of the patient in above purposes and also to avoid the pulmonary aspiration and pressure damage of the eye. But in emergency, this device (L.M.A.) is very much important life saving procedure for patent airway management to ventilate the anaesthetized patient. Ankylosing Spondylitis is always problematic and challenging case to anesthesiologist to anaesthetize the patient for their surgeries. In advanced form of Ankylosing Spondylitis, involvement of axial skeleton provides impracticability of central neuraxial procedure. The involvement of temporomandibular joint and fusion of cervical spine make the condition worst for intubation and general anesthesia become impossible without awake nasal or fiberoptic intubation. But both are troublesome, injurious and painful procedure without acceptance of patient. The Psoas compartment block with sciatic nerve block may form an alternative option to anesthetize. But its' reliability for major operation is doubtful. The sacral spinal anesthesia¹ or sacral epidural anesthesia² through its foramen is anticipated to be impossible due to obliteration of dorsal foramen of sacrum. For the above causes, decision was taken to anesthetize the patient with caudal anesthesia through the drilling hole on the sacral hiatus.

II. Case Report:

A male patient of 40 (forty) year old was admitted for total hip replacement of left leg. Patient is known case of Ankylosing Spondylitis in advanced form. All types of cervical movement were absent, and restricted movement of temporomandibular joint was present with 1.5cm gap between upper and lower incisor teeth. His axial skeleton was fused without any movement of the vertebral column. With previous speculation, neuraxial block or G.A. with help of blind nasal intubation or fiberoptic intubation was avoided. From beginning, it was anticipated the difficulty to be faced with conventional anesthetic technique and decision was taken to introduce caudal anesthesia through the drilling hole on the sacral hiatus.

Usually, Ankylosing Spondylitis is associated with some kinds of systemic involvement like conduction defect, aortic regurgitation, pulmonary fibrosis and cervical spine fracture. At the time of pre-operative observation, patient was thoroughly examined to exclude the above possible complications and to assess the technique of anesthesia. Lucky enough, such complications were absent in this case.

In the O.T (Operation Theater), peripheral infusion and non-invasive monitoring as blood pressure, heart rate and pulse oximetry were started. Anatomical landmarks were identified. The sacral hiatus was located

at the caudal end of the median crest and is surrounded by the sacral cornua. After proper aseptic preparation and local infiltration over identified area, sacral hiatus was drilled by orthopedic surgeon at 45-degree angle in cephalic direction with great caution to avoid the drilling of the anterior wall of the sacral canal. Through this drilling hole, nerve stimulator needle³ was inserted with a careful eye to note the movement of great toe as an evidence of approaching the needle to the sciatic nerve. After appearance of the response of nerve stimulation, 25 ml of 0.75% Ropivacaine, mixed with Clonidine was injected in an epidural space. Last of all, catheter [of contiflex needle] was left in the epidural space to administer local anesthetic when needed. The continuous catheter was taped in place. Heart rate, blood pressure, and spo2 were noted at every 5 minutes. Surgeons were allowed to operate after satisfied sensory and motor block.

Sensory block by pinprick and motor block by modified Bromage scale methods were adopted to estimate the effects of block. We estimated the onset of sensory or motor block (interval between epidural and loss of sensation or motor function of lower limbs respectively) and duration of sensory or motor block (interval between epidural and recovery of sensation or motor respectively).

III. Discussion:

From anaesthetic point of view, Ankylosing Spondylitis is a problematic and challenging event to anesthesiologist to anaesthetize patient due to difficult intubation during general anaesthesia or due to the impracticability of central neuraxial blockade. Involvement of entire spine with progressive ossification of joint cartilage, disk space of the spine and ligaments at their attachment to bone makes impossible to spinal or epidural procedure for surgeries of lower half of the body in advanced form of disease although successful spinal anaesthesia in 76% of patients with Ankylosing Spondylitis had been claimed by Schelew and Vaghadia⁴. On the other hand correlation between mobility restriction and radiological changes indicates that the possibility of spinal or epidural anaesthesia depends on mobility of neck.⁵ From the above stand point, it can be concluded that spinal or epidural anaesthesia is possible with incomplete fusion of lumbar spine. This observation correlates our study of one case of Ankylosing Spondylitis with the total absence of neck mobility. Only for this cause unnecessary painful intrathecal or epidural procedure was avoided. No trial or error method was adopted.

Due to progressive ossification, the cervical spines become stable in extension, but not in flexion. Cervical spines are very much susceptible to fracture and dislocation at the level of C5-C7 vertebrae⁶. The involvement of temporomandibular joint leads to restriction of opening of the mouth. Thus, cervical immobility and restriction of opening of the mouth provide difficulty or impossibility of intubation of the endotracheal tube during general anaesthesia(G.A.). In such a situation, specific approach for intubation can solve the problem⁷. Blind nasal intubation is an alternative procedure to intubate the patient in conscious level, but it is a troublesome technique, and not liked by patient. This painful approach, anyhow, is not a suitable implication of the above problem. Fiberoptic technique is another anaesthetic consideration for tracheal intubation^{8,9}, but it needs sophisticated instrument and expert hands to operate. Moreover, it is also painful and troublesome procedure and done in conscious level and not liked by patient. Another suggestive approach to ventilate the patient during G.A. is advocated to insert laryngeal mask airway (L.M.A.) or intubating L.M.A. This device is appropriate to establish an airway where mask ventilation or tracheal intubation is difficult. Moreover, pulmonary aspiration, laryngospasm and local pharyngeal and laryngeal infection are considered as a contraindication of using such device.¹⁰ Overall role of L.M.A. appears to lie in between facemask and endotracheal intubation because of its better utility than face mask but less reliability to protect airway maintenance during anaesthesia. But, no doubt, it is obvious true that L.M.A. is an essential emergency backup airway device to provide ventilation when conventional mask ventilation and endotracheal intubation fail to do such.

Another supraglottic airway device like Combitube is available to provide an emergency airway. It is, usually, indicated when conventional ways are ineffective or failed to carry out. Its oesophageal balloon provides advantage over L.M.A. by protecting the airway from aspiration, but it presents some disadvantage by excessively deep placement of the tube in oesophagus. As a result of which glottic opening may be obstructed¹¹.

Unfortunately, these are good for minor cases but not suitable and reliable for major cases. Overall, it is obviously true that G.A. with L.M.A. is not an appropriate technique to anaesthetize the advanced case of Ankylosing Spondylitis for major surgery. It is only adoptable when other options are closed to operate.

Although Ankylosing Spondylitis is a progressive inflammatory disease of the axial skeleton, it is almost always associated with some systemic involvement. Cardiovascular, respiratory, and neurological involvement are commonest complications of this disease. Involvement of thoracic skeleton and muscular insertion lead to ankylosis of costovertebral joint with result of limited chest expansion in rigid rib cage and impairment of lung function. Anyhow reduction of vital capacity is minimum due to preservation of diaphragmatic activity.¹¹ Aortic regurgitation and conduction defect may be associated with it.¹² Fortunately, no such complication was present in this case.

Lumbosacral plexus is responsible for sensory and motor innervations of lower limb and easily blocked by administration of local anesthetic in psoas compartment with incomplete involvement of sacral component, otherwise, continuous psoas compartment block is an essential technique to cover up prolonged time required for surgery like total hip replacement.^{13, 14} Anyhow, his technique was not adopted due to its' limitation of block.

Last of all, it was decided to make a hole over the calcified covering of the sacral hiatus. It was drilled by orthopedic surgeon. No damage was done. Fortunately, no vital structure is present beneath the covering of sacral hiatus. Only less important structures like coccygeal and filum terminals are present under the posterior wall. This drilling procedure, innovative in nature, extremely beneficial to patients, opened the closed door of caudal, particularly, in the old age.

The addition of small doses of in. Clonidine (1mcg /kg) to local anesthetic prolongs the analgesic effect by 25%.¹⁵ For the purpose of prolongation of analgesic effect along with its hypotensive activity, needful in the surgical procedure, Clonidine was added to the mixture of local anesthetic to provide also profound sedation to the patient.

In conclusion, drilling procedure of sacral hiatus is the best, harmless and surest option to utilize the benefit of the caudal anesthesia for lower limbs' surgery in absence of easy entry to sacral epidural space either through its dorsal foramen or through its hiatus.

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